TECHNOLOGY DEPT.

Telephon ENGINEER and MANAGEMENT

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AUGUST, 1945

Featuring

CURRENT INTER-COMPANY SETTLEMENT PROBLEMS

By
Walter J. Herrman

•

THE COVER PICTURE—

U. S. Signal Corpsmen constructing a crossarm brace for pole line, somewhere in Australia. Signal Corps photo.

•

VOLUME 49, NUMBER 8. Published monthly by Telephone Engineer Publishing Corporation. Office of Publication, Pontiac, Illinois. Executive and Editorial Office, 7720 Sheridan Road, Chicago, Illinois. Subscription: U. S., Cuba, Mexico, $1.50 per year; Canada $2.00, in all other countries, $3.50. Single copies, U.S.A. 15 cents; single copy JANUARY 15 BLUE BOOK BUYER'S GUIDE $1.00. Entered as second class matter at the post office at Pontiac, Illinois, under the act of March 3, 1879.

THE MAGAZINE OF THE TELEPHONE INDUSTRY

INDUCEMENT THROUGH PERFORMANCE

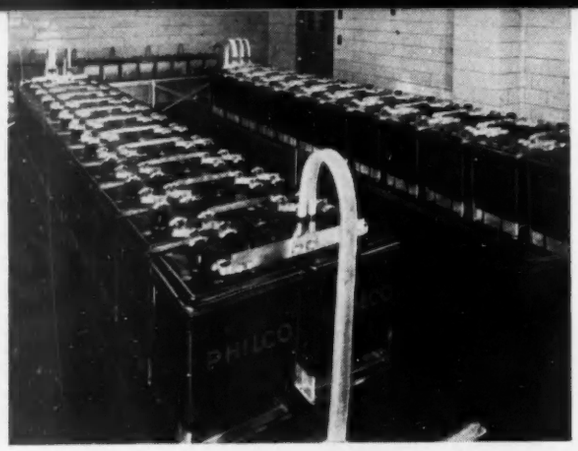
Operating Companies' Experience Results In Ever-Widening Use of LEICH Equipment

The day-to-day work performed by Leich equipment has been the chief reason for its success. In the beginning, Leich telephones and switchboards were employed almost entirely in the area within a few hundred miles of the Leich factory. Today, Leich equipment is used by telephone companies throughout the world. What inducement has led so many telephone operating men to adopt Leich equipment? Simply a trial of it. Every Leich telephone and switchboard is engineered and constructed to earn the approval of practical telephone men. Specifications, prices and delivery schedules on all Leich equipment may be obtained by writing Leich Sales Corporation, 427 W. Randolph Street, Chicago, Illinois.

LEICH

MANUFACTURERS OF TELEPHONES, SWITCHBOARDS

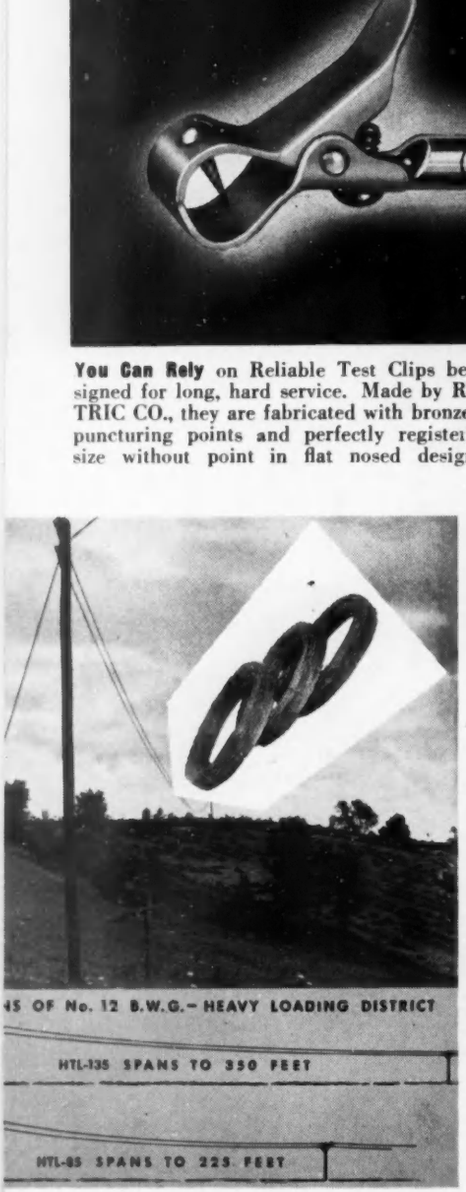
AND RELATED APPARATUS SINCE 1907



On Guard! With this 48 cell PHILCO Battery installation, the Pennsylvania Telephone Corporation, Johnstown, Pa., maintains an ever-dependable power reserve. The cells shown here are the Philco Type 23FFP, with supported elements, famous Floté grids, and annealed steel glass jars.

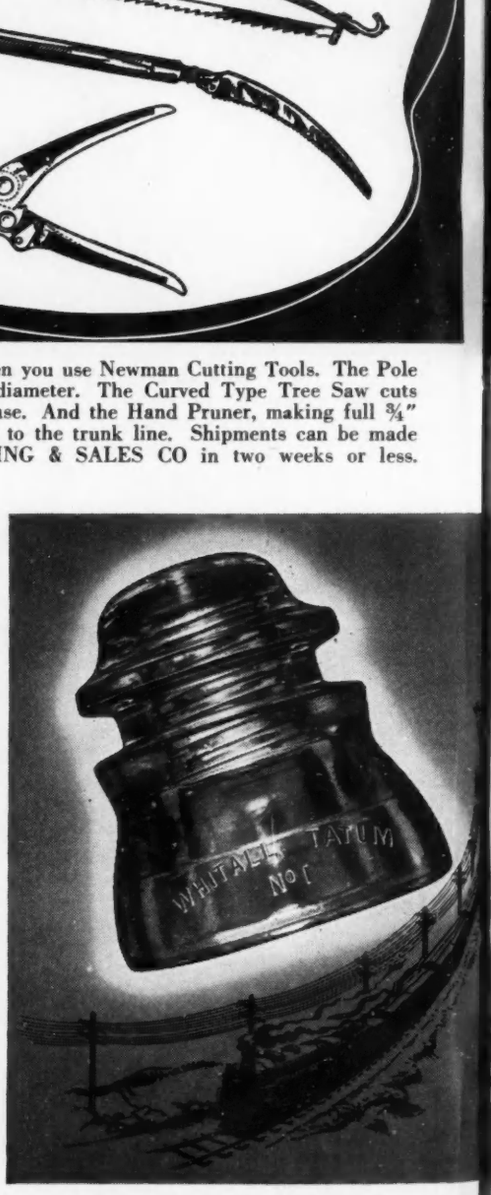
You Can Rely on Reliable Test Clips because they're designed for long, hard service. Made by RELIABLE ELECTRIC CO., they are fabricated with bronze, have insulation-puncturing points and perfectly registering teeth. Small size without point in flat nosed design also available.

Fast, Easy Cutting is assured when you use Newman Cutting Tools. The Pole Tree Saw cuts limbs up to 8" diameter. The Curved Type Tree Saw cuts limbs over 1½" diameter with ease. And the Hand Pruner, making full ¾" cuts easily, permits cutting close to the trunk line. Shipments can be made by NEWMAN MANUFACTURING & SALES CO in two weeks or less.

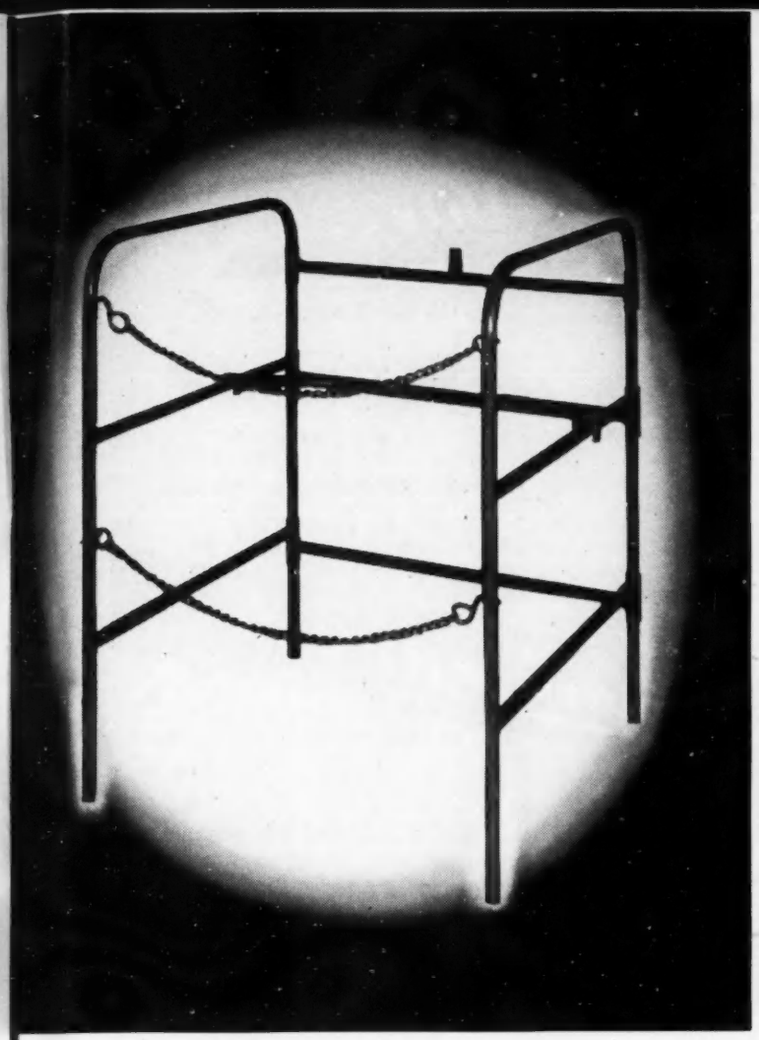


ave Two Ways on line wire replacement and onstruction by standardizing on INDIANA TEEL & WIRE CO.'S Crapo HTL-85 and ITL-135 Line Wire. You'll realize substantial avings in construction costs and maintenance ex- ense. Galvanized by the famous Crapo Process.

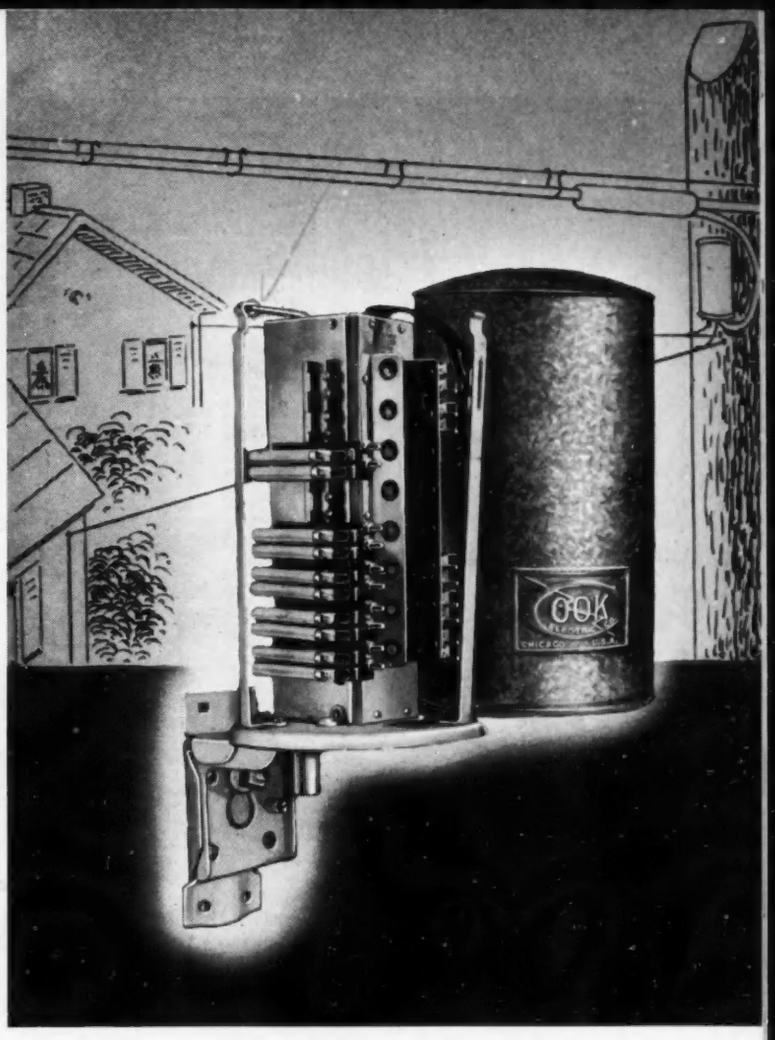
Exceptional Strength is one important reason why Ironite Drop Wire stands unusual strains, and why you can use it with complete safety. Ironite Drop Wire is "armored" for extra protection against weather extremes. Made by PARAGON ELECTRIC CO., it has great strength, high conductivity and economy.



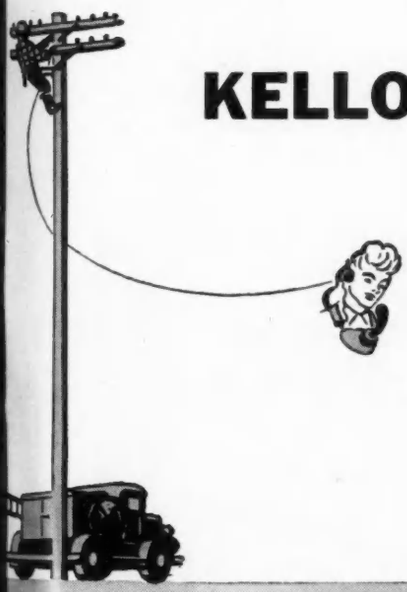
Meet Every Service Need. That's why Armstrong's Whitall Tatum Insulators are in such wide demand. Made by ARMSTRONG CORK COMPANY, these quality insulators have crystal clarity of glass, accurate gaging, and unusual resistance to wide variations in temperature.



Safety is First in every piece of Cope Manhole Equipment. The Cope Type 264 Guard Rail is made with a completely welded construction, doing away with pipe fittings and riveted eyes which have proved weak points in manhole guard construction. Made by T. J. COPE, INC., it has a bow-shaped wing brace which holds the rail absolutely rigid against collapse when in place.



Convenience, Accessibility, and Economy are the outstanding features of COOK ELECTRIC COMPANY'S S-20 Pole Cable Terminal and protector mounting. Drop connections, fuses and lightning dischargers are easily reached at the front; the self-soldering nozzle lies close to the pole. A strong guide holds the hood securely in raised position for complete working ease.



KELLOGG Recommends and Guarantees These Finer Supplies

. . . and that is your assurance that the line supply and construction materials shown here—all products of leading manufacturers—can be relied on for dependable service and lasting satisfaction. Like all line supplies listed and described in the Kellogg catalog, they are backed by the famous Kellogg "double guarantee." This is your best assurance of getting materials that will perform properly over a long period of time. Send your orders to . . .

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Factory and General Offices: 6650 South Cicero Avenue, Chicago 38, Illinois
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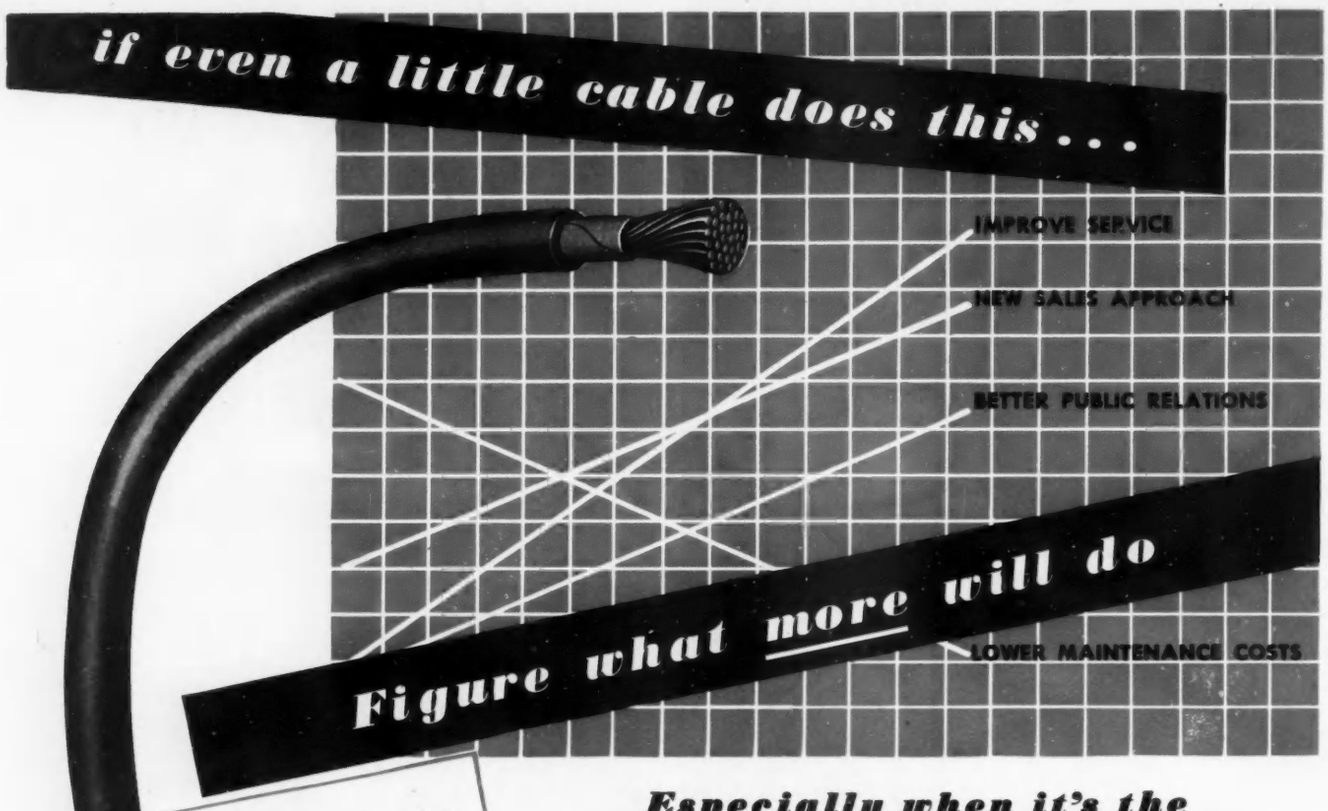
Order Your Line Supplies from KELLOGG


if even a little cable does this . . .
IMPROVE SERVICE
NEW SALES APPROACH
BETTER PUBLIC RELATIONS
Figure what more will do
LOWER MAINTENANCE COSTS

Kellogg's Outside Plant Engineering Service Covers These Vital Points . . .

- Scientifically analyzing your community in relation to outside plant requirements to determine the practicability of open wire, aerial cable and underground cable.
- Laying out cable plants to assure adequate sizes and flexibility of cable pairs and to provide the most economical means to handle expansion.
- Rearranging cable and cable pairs to permit extensions and additions without the loss of existing plant.
- Analyzing right-of-way to determine the best routing at lowest practical cost.
- Recommending the most economical construction methods and equipment.
- Specifying proper and adequate termination and protection equipment.
- Providing for additions or replacements without disturbing main cable splices.
- Observing electrical codes in locating cable so as to guard against power line hazards.
- Assuring cable plants of maximum transmission efficiency.
- Reducing your present maintenance expense of outside plant.

These are just a few of the many important considerations involved in engineering a sound, efficient cable system. For full details, check with Kellogg's Outside Plant Engineering Service.

Especially when it's the Right Cable Installed Right

Do you fully realize how much that short piece of cable from your exchange building to the first or second pole means to you? Think it over—here's one part of your system that provides peak transmission efficiency year-in year-out, under toughest weather conditions . . . that you can virtually forget as far as maintenance is concerned.

Now think how you can multiply these advantages many times over by installing cable in other parts of your system and get still better service, still greater maintenance savings!

But to assure the maximum benefits when you come to extend your cable, insist upon the *right* cable installed *right*. Be sure to use "Roebling" cable, the cable that has a background of outstanding service to the industry . . . a product of over 100 years of specialized wire manufacture.

Then take advantage of Kellogg's Outside Plant Engineering Service, where specialists will check your plans, make sound recommendations, and guide you in the right direction throughout.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY

ROEBLING

JAR ROEBLING **TELEPHONE CABLE**

SINCE 1897 KELLOGG

Distributed by **KELLOGG**
SWITCHBOARD & SUPPLY CO.
6650 South Cicero Avenue, Chicago 38, Illinois

"It Seems to Us"

Travel is certainly tough. We tip our hats to those whose essential business trips require many hours on trains. Ben Johnson, that genial sales mgr. of Oliver Iron and Steel, is one in particular.

•

DeWitt "Gibby" Gibson, (Leich Sales) is one of the top football officials of the midwest and works in many of the big games during the fall. Has anyone heard what he does on Saturday afternoons during this kind of weather?

•

Without the conventions to bring folks together, we miss the opportunity to "visit" and keep track of one another as we used to do. If something interesting has been happening to you, write us. This column is a "clearing house" for news.

•

For one of the most remarkable jobs in company growth that it has been our privilege to observe over the years, A. J. Kohn with his Schauer Machine Company at Cincinnati should receive commendation.

•

It's still tough to get hotel rooms. Ban on conventions hasn't helped, far as we can see.

Speaking of hotels—Danny Amico, the man who used to serve the telephone people so well when national conventions were held at Hotel Sherman, is taking over the job of sales director at Congress Hotel here in Chicago. Congress Hotel opened July 31. Danny takes good care of telephone people.

•

Jim Kearney, Jr., president of Jas. R. Kearney Corp., St. Louis, could bid for top honors in the telephone industry as a golfer. He carded a 77 in a recent tournament.

•

Hal McNaughton, the Indiana Steel and Wire man who is so often mistaken for Paul McNutt (with whom he went to school), used to be a sports writer for a metropolitan newspaper.

TELEPHONE ENGINEER AND MANAGEMENT

Vol. 49, No. 8 **AUGUST, 1945**

CONTENTS

- It Seems To Us 7
- Editorial—Democracy at Work 24
- News Briefs 25
- AN EXCLUSIVE FEATURE
  Current Inter-Company Settlement Problems
  By Walter J. Herrman..... 26
- The Observation Tower
  By the Observer and His Gang..... 28
- TELEPHONE ENGINEER'S Radio Course
  For Telephone Men, Chapter 5, Section 2..... 30
- Personalities in the News 33
- Underground Conduit Construction
  By George W. Stacey..... 34
- Telephone Company Sponsored Army Units Receive Recognition—By Roland C. Davies..... 37
- Line & Desk—Edited by J. S. Reed, Jr..... 44
- Highlights of the Communication News
  By Roland C. Davies 48
- Harry C. Ingles Wire Span..... 58
- Bell System Expansion Program..... 60
- Guam Has Automatic Telephone System..... 62
- Conference on Rural Problems in Illinois..... 64
- Colonel Henry Completes War Duties..... 66
- TELEPHONE ENGINEER Handbook Tables 70
- Index to Advertisers 78

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Founded in 1909

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Highway line construction and maintenance bodies are of "all-metal" construction with large platform loading space and roomy tool and material compartments, all designed and arranged to efficiently serve construction and maintenance crews.

Lightweight, rugged construction, combined with balanced design, assures proper weight distribution under all working conditions and adds to the efficiency of the truck.

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"WE had a three-week job ahead of us," said the Supervising Construction Foreman. But the Captain from Camp Headquarters told him the new line must be ready for service the following night. Yes, the job was finished . . . in the same way numerous other emergency jobs had been finished before—by sheer drive and determination, plus plenty of telephone engineering know how.

Quick action has been the order of the day from Pearl Harbor right up to now. And it will be like that until V-J Day and some time beyond. But telephone workers in every department take the "quick action" jobs in their stride. Prompt and efficient service is part of the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

ARMY E NAVY

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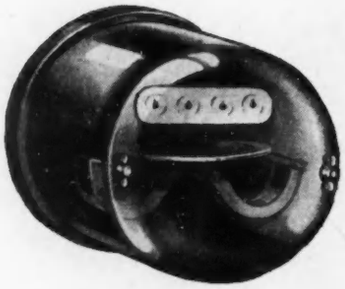
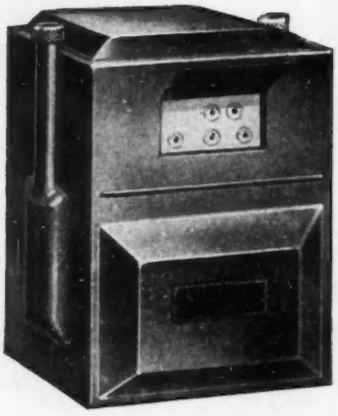
CALCULAGRAPH
DOES FOR LONG DISTANCE CALLS –



What METERS do for the GAS AND ELECTRIC UTILITIES

•

This METER measures kilowatt hours of electricity used



•

This METER measures cubic feet of gas consumed

•

MODEL 33

THE CALCULAGRAPH METERS the elapsed time of toll calls

The CALCULAGRAPH serves the telephone industry by printing accurate records of toll calls as a basis for billing. These records show starting time and the chargeable elapsed time to the second on each toll ticket.

Reliability and simplicity of operation have made the Calculagraph standard equipment for telephone companies throughout the world.

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Incorporated 1892

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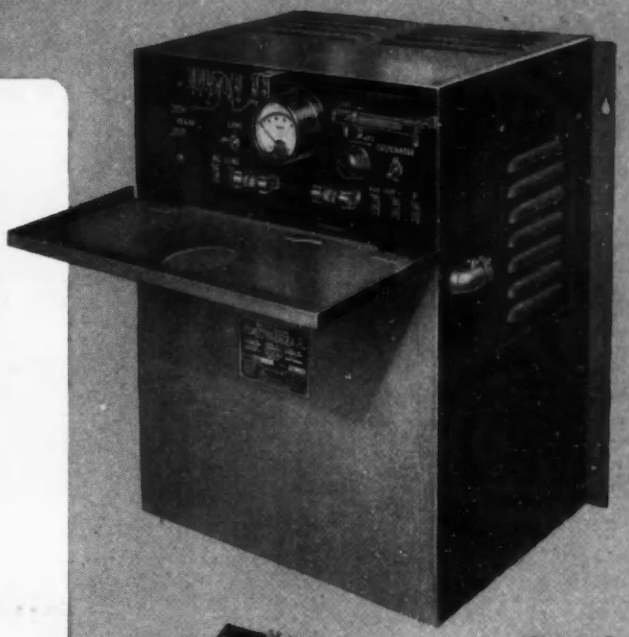
Provides Efficient and Economical Service

RectiChargeRs

Entirely automatic in operation Raytheon RectiChargeRs and batteries give you an automatic A.C.-D.C. power system. Check these RectiChargeR advantages:

- Keep batteries fully charged.
- Prevent overcharge and undercharge.
- Eliminate voltage variations.
- Increase battery life as much as 40%.
- Reduce battery maintenance and inspection to once or twice yearly.
- Complete range of units—11/12 and 22/24 cells . . . 1 to 12 amps . . . many models for 50 cycles input.



RectiChargeR with cover open

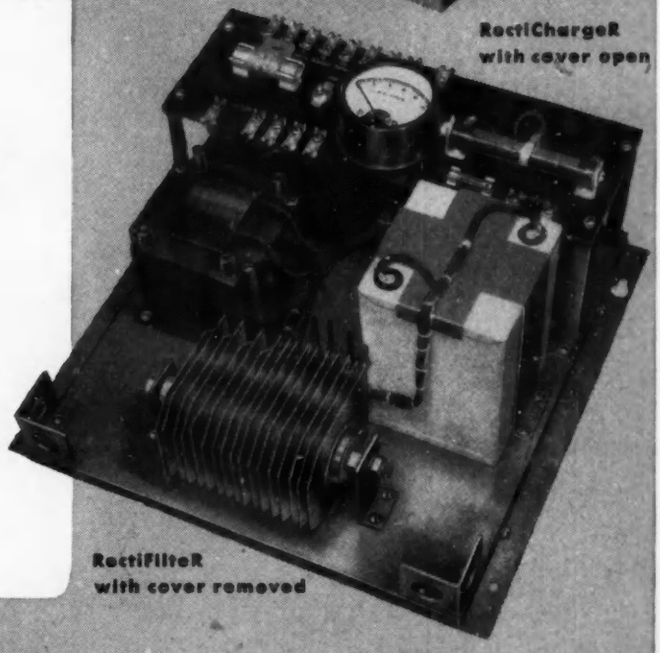
RectiFilteRs

(battery eliminators)

Whether it's a PBX or PAX system, Raytheon RectiFilteRs eliminate batteries and the expense of routine service. Note these additional RectiFilteR performance features:

- Release charging cable pairs, at remote locations, for revenue producing service.
- Provide stabilized D.C. output voltage from no load to full load.
- Minimize power costs because of high efficiency in converting A.C. to D.C.
- Save $30 to $90 a year.
- Wide range of models for varied operations . . . 50 or 60 cycles.

Write for bulletins, today.



RectiFilteR with cover removed

Tune in the Raytheon radio program: "MEET YOUR NAVY," every Saturday night on the Blue Network. Consult your local newspaper for time and station

RAYTHEON MANUFACTURING COMPANY

Electrical Equipment Division

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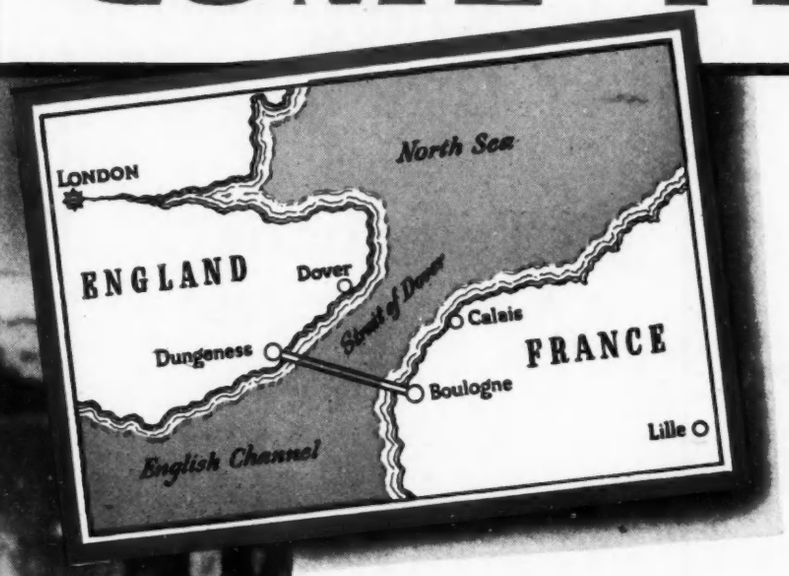
The coveted Army-Navy "E", for Excellence in the manufacture of war equipment and tubes, flies over all four Raytheon Plants where over 16,000 men and women are producing for VICTORY.

Devoted to research and manufacture of complete electronic equipment; receiving, transmitting and hearing aid tubes; transformers; and voltage stabilizers.

A PIPE DREAM

Extruded on this giant Vacuum Lead Press, 2500 ft. lengths of special 3 inch I. D. pipe were welded into 35 miles of continuous pipeline, coated with asphalt, taped with paper, vinylite fabric tapes and steel bands, and armored with steel wires bedded in and covered with asphalt saturated jute servings . . . Insert shows cross-section of pipe whose length was laid in five hours by the special cable-laying ship.

COME TRUE . . .



With the active interest of General Eisenhower, and Allied officers, Admiral Lord Louis Mountbatten conceived a series of pipelines under the English Channel to feed precious oil and gasoline to Allied fighting forces speeding across France, Belgium, Luxembourg and Germany.

Experience in making the largest submarine electric-power cables enabled General Cable to volunteer undertaking its part of this important contract with its own existing facilities. General Cable quickly started making this continuous 35-mile pipe, thanks to available equipment commandeered from its coast-to-coast plants, its wealth of research and engineering talent, plus dogged determination to speed Victory. In about nine months from installation, the under sea traffic fuel from England to the continent via channel pipelines had totalled 120,000,000 gallons, freeing oil tankers, cars and other transport for more vital duties. With public recording of this secret comes the buoyant feeling that dreams do come true and many more, as yet unrevealed, will foster progress in a peace we all can share.

GENERAL CABLE CORPORATION

General Cable Products for the Telephone Industry are Distributed by

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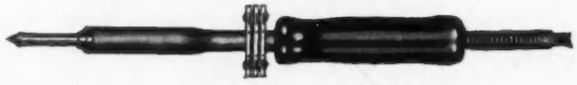
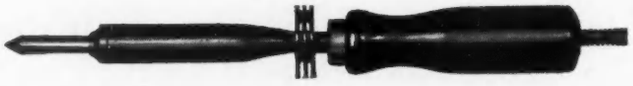
DRAKE — A NAME TO REMEMBER for RELIABLE SOLDERING EQUIPMENT

Through 25 years of soldering iron manufacturing, Drake has developed soldering products that set new high standards of quality and long-lived performance.



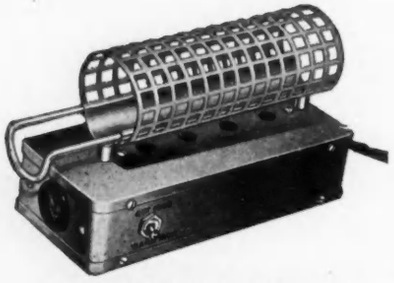
DRAKE No. 400, for example, is ideal for work in small places—weighs only 8 ounces and is only 9 inches long, yet it is a 60-watt iron.



DRAKE No. 600-10, is conservatively rated at 100 watts, but is only 10 inches long.

DRAKE SOLDER POTS

are available in 150 and 300 watt ratings to meet varying needs.



DRAKE HEAT CONTROL

is a fool-proof device for keeping idling irons ready for quick use.

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First Essential to Postwar Progress

Many Independent telephone companies, after years of operation with no more than a meager return on investment, now find themselves financially unable to earn an adequate return on the capital needed to modernize plant and service to meet present-day needs. Knowing how much Strowger Automatic equipment has done for the industry in reducing operating costs and increasing revenues, these companies often come to us for solutions to their problems.

To most of them, we are able to say, "Yes, Strowger Automatic can help you." To many of them we must also say, "Whether you convert to automatic or not, you need higher rates."

All too often, these companies are operating under rates which were established years ago, and which even at the beginning were sufficient only to cover direct costs of operation, leaving little or no reserve for plant replacement and return on invested capital. Considering the many increases in operating expense which have meanwhile occurred—including increases resulting from Wage-Hour legislation—it is no wonder that many companies have been unable to accumulate the funds which they need now to provide more modern service.

If this condition exists in your properties, you owe it to your subscribers to state your position frankly and to request rates which are commensurate with today's costs. Give them the facts, and they will readily understand that you must first receive adequate revenue for your present service, before you can take steps to provide the modern service they will soon be demanding.

When you are ready to purchase equipment for modernization, you may need credit. We are prepared to arrange such credit on reasonable terms and conditions.

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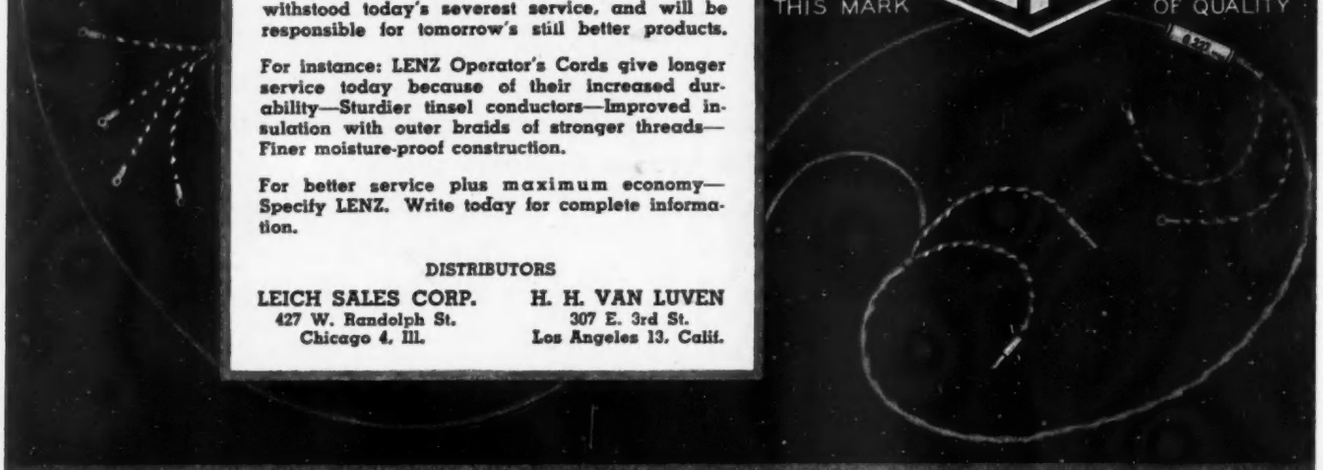


LENZ ELECTRIC MANUFACTURING CO.

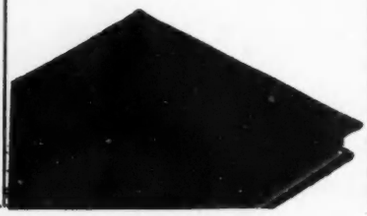
1751 N. WESTERN AVE., CHICAGO 47, ILL., U. S. A.

"IN BUSINESS SINCE 1904"

What the

COMMUNICATIONS WORKER NEEDS

to know about electricity



Clearly treats such topics as:

- **electric measuring instruments**
- **electric networks**
- **bridge circuits**
- **transmission of electromagnetic waves**
- **vacuum tubes as circuit elements**
- **electroacoustics**

Radio men, telephone engineers, telegraphy technicians—all workers in the communication industry—here is a book written expressly for you. It gives you a clear, practical explantation of the fundamentals of electrical engineering ***upon which communication is based.*** All the explanations, all the illustrations, all the applications, are taken from the communication industry and not from the power industry.

The ELECTRICAL FUNDAMENTALS of COMMUNICATION

By ARTHUR L. ALBERT

Professor, Communication Engineering, Oregon State College; Professor, Electrical Engineering, Purdue University (1942-43)

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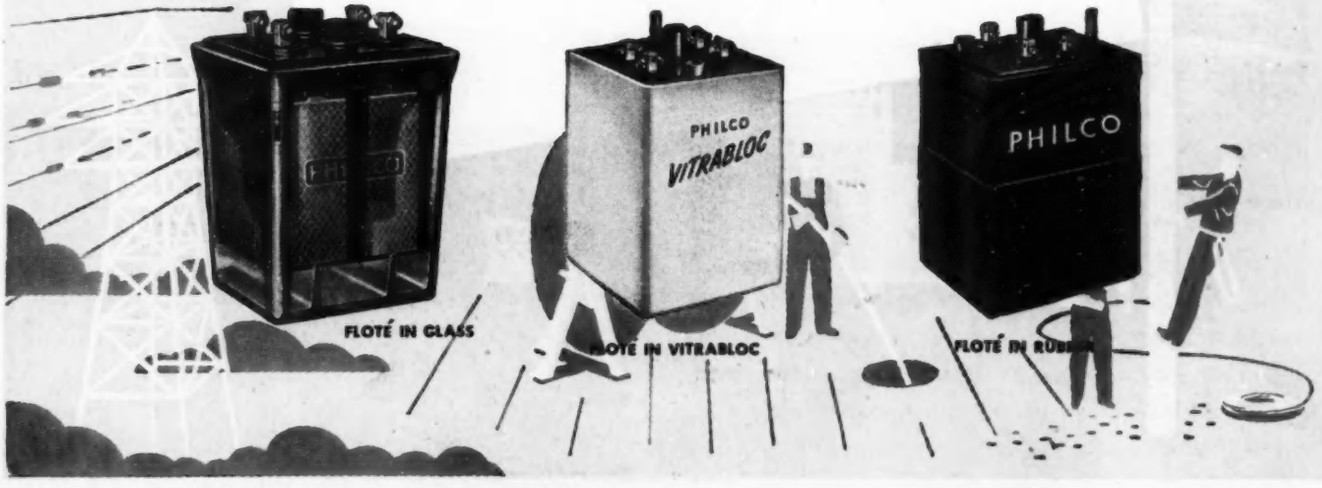
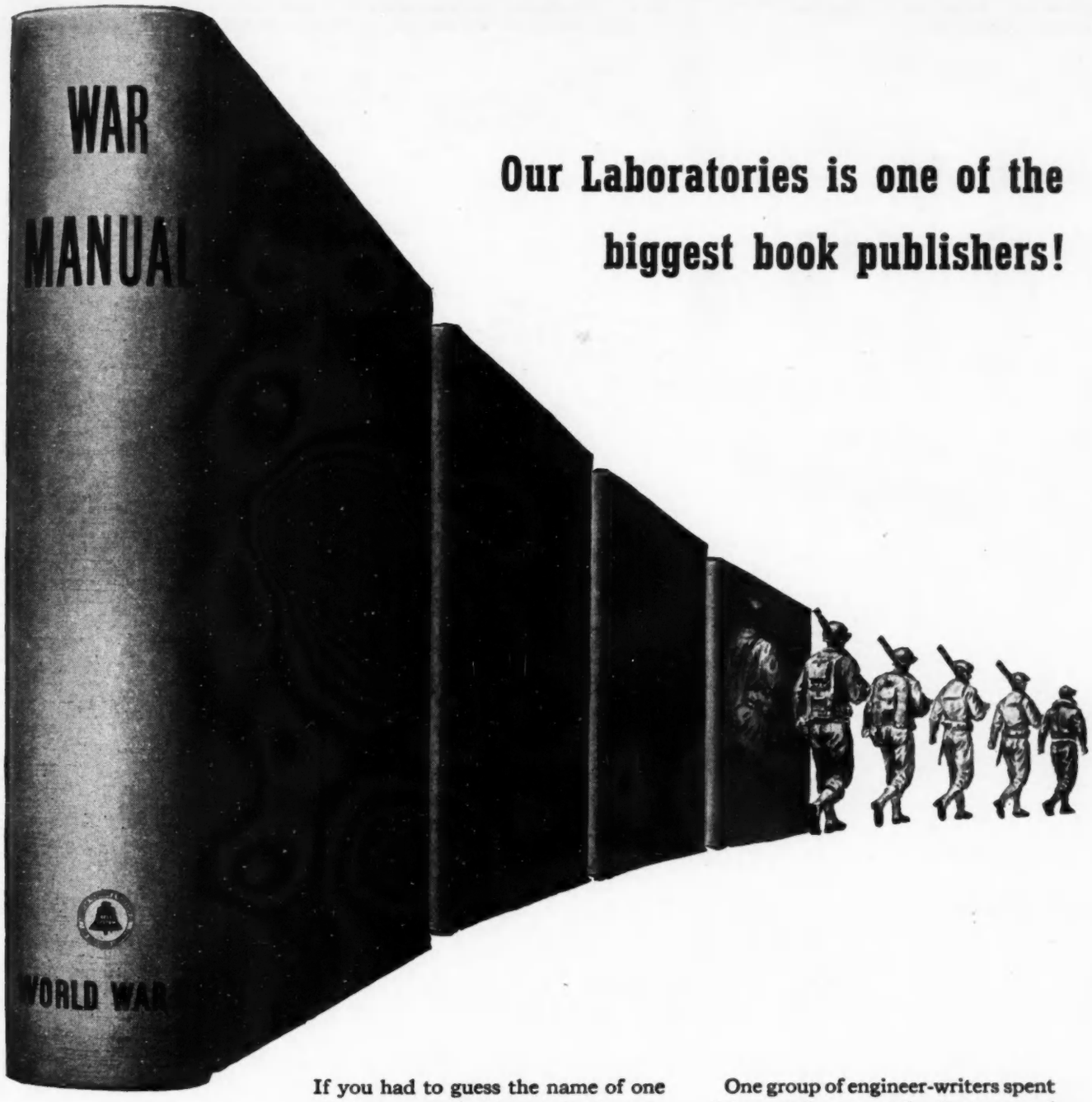


BOOK REVIEW

• **The public has learned to expect startling revelations from modern scientific laboratories. An unusual fact is that one of the nation's biggest *book publishers* is the Bell Telephone Laboratories.**

• **The advertisement on the opposite page, appearing in national magazines during August, discloses some interesting side-lights on this important war job. It helps to underscore the contributions which the various branches of the telephone industry are making toward Victory.**

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM



Our Laboratories is one of the biggest book publishers!

If you had to guess the name of one of the country's biggest book publishers, the chances are you wouldn't think of Bell Telephone Laboratories.

Yet, in the number of books prepared for publication during the past year, the Laboratories outranks the largest book publisher in the country.

Many of these—prepared for the Army and Navy—are twice the size of the average novel. Some contain 1000 pages. All contain numerous photographs and technical drawings in addition to the text.

One group of engineer-writers spent eight months on one book, a manual for a secret electronic device. Another volume, equally thick, was written by one man in five months. Still another required the full time of one writer for a year and a half.

This publishing achievement is one of the yardsticks by which the Laboratories' war contribution may be measured. That's because each book is an instruction manual to accompany equipment designed by Bell Laboratories for the Armed Forces.

BELL TELEPHONE SYSTEM

Please Remember these dates!

Two valuable working tools for telephone construction, maintenance, and operating men . . . . .

September 15 — **TELEPHONE ENGINEER and MANAGEMENT** ***will feature***

FALL CONSTRUCTION and WINTERTIME PRACTICES

Prepared with today's unusual problems and available materials in mind, this issue will prove quite popular with all telephone men. If you have any construction or maintenance problems puzzling you, send them to the editor.

November 1 — **FORTNIGHTLY TELEPHONE ENGINEER** ***will display***

NEW TELEPHONE PRODUCTS and APPLICATIONS

The usual showplace for new telephone products and new applications is at the annual telephone convention. With same not being held this year, FORTNIGHTLY TELEPHONE ENGINEER will serve as an industry showroom . . . and display at every telephone company in the United States. Considerable space in this important number has already been reserved by manufacturers serving the industry.

Manufacturers wishing more information write
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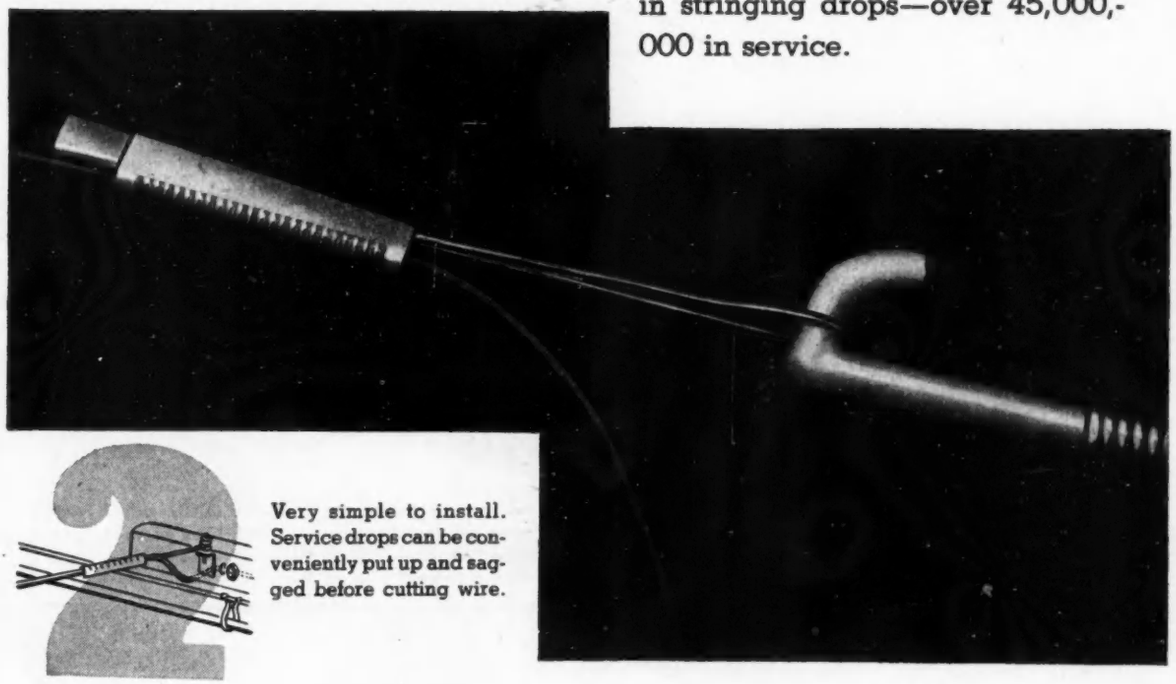
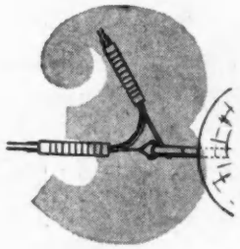
Reliable
because...

Employing a wedge principle, Reliable Drop Wire Clamps tighten automatically under load with the assurance of a firm grip without damaging insulation.

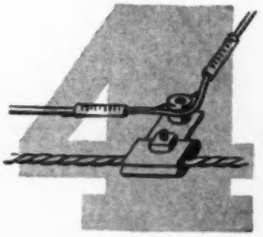
—years of field service have more than confirmed the superior features of the Reliable Type P Drop Wire Clamp. Their widespread use has proved a pronounced economy in stringing drops—over 45,000,000 in service.



Very simple to install. Service drops can be conveniently put up and sagged before cutting wire.



Non-corrosive metals are used throughout. A large margin of strength above actual field requirements is provided. Clamps can be re-used.



A universal clamp for any type of drop wire dead-end. Fits all makes of hardware and can be used with any standard make of twisted pair or parallel drop wire.

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GENERAL AGENT FOR SURPLUS GOVERNMENT COMMUNICATION AND ELECTRONIC EQUIPMENT

Stromberg-Carlson is pleased to announce its appointment by the Reconstruction Finance Corporation as a general agent for the disposal of surplus wartime communication and electronic equipment.

This appointment will give the company an opportunity to offer the telephone trade not only all Stromberg-Carlson telephone and electronic equipment declared by the Government to be surplus but equipment of other makes, as well. It will also enable Stromberg-Carlson to offer the trade many of the supply items regularly distributed by the company which are no longer needed for the war effort.

Stromberg-Carlson feels that in accepting this appointment it is contributing a valuable service both to the Government and to the telephone trade by assisting in the orderly disposition of this surplus wartime equipment.

All surplus Stromberg-Carlson equipment sold by our agency will carry the company's regular guarantee. Sales will be made through the representative who regularly calls on you. He will be advised as items become available and will contact you regarding them.

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...*LIVES ARE NOT!*
Let's buy *all* the War Bonds we can—*keep* all we buy.

EDITORIAL

Democracy At Work

MR. OSCAR BURTON, President of the Texas Telephone Association and Chairman of the special Legislation Committee of the United States Independent Telephone Association, has made a suggestion to the directors of the Texas Association which we think should also be made to all Independent telephone people.

Mr. Burton points out that the House of Representatives of Congress has recessed until October of this year, and that most of the Representatives will return to their home districts, and will be available there for discussions with their constituents. (Since Mr. Burton's suggestion was made, the Senate has also recessed until October, and most Senators will probably also return to their home states for at least a part of the recess period.)

Mr. Burton suggests that telephone people take this opportunity to tell their Congressional representatives what they think about things.

The advice given by Mr. Burton was specifically that telephone people should talk to their Congressional representatives about the pending rural telephone legislation and about the plans of the industry to itself take care of the rural telephone situation when materials and manpower are available for the purpose.

We make this mild and friendly criticism of Mr. Burton's advice: He did not go far enough. The rural telephone situation is only one of the things that affect telephone people and the telephone industry, in which Congress is now interesting itself, and which telephone people should talk about to their Congressmen.

There are, for instance, such things now under consideration by Congress, or Congressional committees, or by members of Congress, as the proposed amendment to the Wage-Hour law which would provide a statute of limitations on suits of certain kinds. There is a proposed joint resolution of Congress fixing a new level of minimum wages. There are other bills or matters of importance to the telephone industry, including a variety of questions regarding the existing partnership of the Government in the telephone business and all other businesses, via Federal taxes.

As to taxes, there is one item we think every business man should talk to his Congressman about—that is the great annual business guessing contest which goes legally under the name of the Federal "Capital Stock Tax." This is the tax which requires the management of every corporation to guess, in the middle of the year, what the corporation's profits will be for the whole year—and to then multiply the guess by ten and pay a tax on the result—and get penalized to a fare-you-well if the guess is too low.

This tax is not only a nuisance to everybody concerned; it is also imposed in a manner that is unfair. Every member of Congress should be told that, by people who have to take the risk of the guessing contest.

OF COURSE telephone people should talk to their Congressional representatives about rural telephone legislation. There seems to be a mixture of sentiments in the industry about such legislation, but there is one feature of it on which all telephone people can certainly agree. That is on the provisions under which states and municipalities can go into the telephone business with cheap public money.

Certainly every member of Congress should be told, and in concrete terms, what this would mean to the telephone service of this country. It would mean, of course, a recurrence of the old competitive telephone exchange service, under which the public had to have two telephones—and which was a burden on the public and on the industry as well.

We live in a democracy, and everyone of us has a perfect right to tell our governmental representatives exactly what we think about anything they are doing. It is as much our business as it is theirs. That is the way to make a democracy work.

We agree with Oscar Burton—let's tell 'em!

NEWS Briefs...

Merger Plan Okayed by SEC

The merger plan of the Kansas Power Company and the Western Light & Telephone has been okayed by the Securities and Exchange Commission and when consummated will be known as the Western Light & Telephone Company. It is a Kansas corporation furnishing electric, telephone, gas and water service to approximately 275 communities and serving approximately 80,000 customers. A substantial part of the operating territory of the company will be in Kansas and the company also will serve a substantial number of communities in Missouri, Iowa and Oklahoma.

The new company will have assets of approximately $19,000,000 and the annual gross revenues will amount to about $4,200,000. The company will have 18 electric power plants of 28,600 kilowatts capacity; and 103 telephone exchanges, 10 natural gas properties, 5 water properties and 7 ice plants.

The merger will result in the simplification of the capital structure and the combining of the experienced personnel of both companies, numbering approximately 800 who will continue with the new company, and will be of considerable value to the customers, the company and the security holders.

A stockholders' meeting of the Kansas Power company was held August 7, and of Western Light and Telephone company August 8. At the meetings, the proposed plan was submitted to the stockholders for approval.

Plans New Building and Equipment in Missouri

Announcement has been made by F. M. Brown, general manager of the Western Light & Telephone Company, that property had been purchased in West Plains, Mo., and erection of a new building to house the local telephone exchange is planned. According to the announcement carried by local newspapers the newest improved equipment will be used including a new switchboard.

Merrill Called by Utah On Rate Investigation

Eugene Merrill, Chief of the WPB Communications Division's telephone section is now in Utah to participate in the rehearing proceedings on the interstate toll rate investigation of the Mountain States Telephone & Telegraph Co. by the Utah Commission. Mr. Merrill was chief engineer of the Utah Commission before he came to Washington and was in the original investigation of the Mountain States toll rate case, which was lost in the state courts and sent back for reconsideration by the regulatory body.

Illinois Bell Takes Over Four Small Exchanges

Exchanges at Petersburg, Athens, Tallula and Oakford, in Menard County northwest of Springfield, Ill., became operating units of the Illinois Bell System recently when that company took over operation of the Peoples Telephone and Telegraph Company of Petersburg. The four exchanges serve a total of 1,265 telephones.

The Peoples company was organized in 1911 to effect a consolidation of the Petersburg Telephone Company and the Central Union Telephone Company. In 1912 the two plants were merged under the control of the Peoples company, the Central Union company taking stock in the new company for its properties. Illinois Bell acquired the operating properties of the Central Union in 1920, and later purchased the stock of the Peoples company. Since 1925 control of the Peoples company has been in the hands of Illinois Bell.

All of the Peoples company employees will be retained. Several have had more than 20 years of service; three have been with the company since it was formed.

New Salem State Park, two miles south of Petersburg, receives its service from the Petersburg exchange.

Commonwealth Takes Over Wisconsin Company

Announcement has been made by Walter Dakin, president of the Commonwealth Telephone Co., Madison, Wisc., that operation of the Brodhead (Wisc.) Telephone Company had been acquired and placed under operation of the Commonwealth company July 2.

According to newspaper reports, negotiations had been under way for several months; and following a hearing before the Wisconsin Public Service Commission on June 11, an order was issued June 28 authorizing the purchase of the exchange. Present employees at Brodhead will be retained.

No important changes in operations at Brodhead are planned at this time, Mr. Dakin stated, although he said that a fairly large amount of repair work would be done in the near future.

Plan to Reorganize Iowa Company As Cooperative

Stockholders of the Rockwell (Iowa) Farmers Telephone Company have voted to buy the large block of stock owned by W. D. Lattimer, Mason City, Ia., who has managed the company since 1933 with a view of forming a local cooperative organization to operate the exchanges there and in Dougherty, Ia.

The stock brought $100 per share which is double its par value of $50. A bonus was also allowed because of the size of the block. Lattimer, taking over the managership in 1933, brought the company through the depression and established it as a sound, growing concern. Previously stock value was far below par. Charter of the present company expires in 1947 and the new cooperative group expect to have the new company operating before that time cooperatively financed.

Incorporates Iowa Company

Articles of incorporation of the Victory Telephone Company of Waverly, Iowa, were filed during July. C. I. Heady is president of the company capitalized at $10,000.

Are Existing Contracts Outmoded By New Bell System Procedures?

Current INTER-COMPANY Settlement Problems

By

Walter J. Herrman

Vice President, Gary Services and Investment Company Member, Toll Compensation Committee of U. S. I. T. A.

The question as to how the many Independent telephone companies which are not receiving sufficient toll revenues can obtain the necessary increases required to cover costs plus a reasonable profit on terminal and line-haul operations has plagued the industry for many years. While the efforts of the Toll Compensation Committee, under the able chairmanship of E. M. Blakeslee, have resulted in substantial improvement in this situation, it seems apparent that the limitations of the existing general formulae may penalize many Independents very seriously. The accompanying article has been written in an attempt to move this subject forward to a conclusion equitable to all Independent companies.

AT a joint meeting of the Toll Compensation Committee of the United States Independent Telephone Association and representatives of the American Telephone and Telegraph Company in December, 1944, the Bell Company disclosed to the Committee that it was then in process of working out a completely new procedure for handling intercompany settlements applicable to joint toll traffic between the companies in the American Telephone and Telegraph system. This new procedure, which is understood to have now been made generally effective, contemplates reimbursement of the costs of each entity plus a pro rata division of any remaining profits, and supersedes the former sliding scale arrangement involving payments for terminal operation based on average message value and for line-haul operation based on mileage.

The adoption of these new settlement procedures *within* the Bell System represents an important milestone in the long controversial subject of settlements *between* the Bell System and the Independent carriers. For many years representatives of the Independent companies have argued for the very principle which has now been put into practical operation—compensation for services rendered on a basis which would meet the costs of such services plus a share of any remaining over-all profits. In actual fact, however, the Independents seem to have been kept rather busy endeavoring to obtain reimbursement for the more obvious out-of-pocket expenses and while substantial progress has been made toward this limited end, there is much doubt if even such bare costs are being collected at

the present time. Under the circumstances, and until basic costs are fully met, the idea of sharing in any overall profits has remained largely an ideal.

Let us review the background of this problem in an effort to understand the reasons which may have contributed to this unsatisfactory state of affairs. As in many such situations, there seem to be several factors involved, and to complicate the matter, certain of these factors themselves have been undergoing gradual changes over a period of years.

In the early days of the industry, exchange service was all-important and toll service incidental. However, to the Independent operator, connection to the toll network was an obviously vital consideration, even though the utilization of such a connection was small. On the other hand, since the use was so small, the relative cost of terminating toll calls was practically nil, and as a consequence many operators presumably would have been content to handle long distance calls gratis in return for the availability of the toll connection and the resulting increased service value they could give to their subscribers. Under the circumstances toll tariffs originally were constructed on a simple mileage basis, averaging approximately six mills per mile for the initial station to station day rate, regardless of the length of haul, and apparently without provision for terminal costs.

As the volme of toll traffic increased, several things began to happen. Toll connections soon came to be regarded not as arrangements of unilateral benefit, but of mutual benefit, and as a result the terminal operators began to appreciate the necessity of recovering the costs associated with the toll business out of the toll revenues. Generally speaking, however, the "commissions" which they were able to negotiate were small, frequently 10% of the revenue involved and in many cases limited to a maximum per message rate of 10c to 15c. Methods of payment varied from state to state and from company to company; the only area of agreement among the Independents seemed to be toward getting as much revenue as possible for the services rendered, while the Bell companies quite naturally took the opposite view.

WITH the gradual completion of a nation-wide toll network, the length and value of the average message increased accordingly and many Independent companies which had been receiving a "ceiling" rate of so much per message began to demand a share in these increases. At the same time, the expenses of the terminal carriers were not only greater for the longer calls because of the increased work performed, but the costs of each unit of work was

THE AUTHOR

Walter J. Herrman

increasing due to higher wages. These considerations, coupled with the generally accepted belief that the Bell System was enjoying very lucrative profits from its portion of the toll business, led to the introduction, in most parts of the country, of the sliding scale schedule, an arrangement which reduced all messages to an average value and allocated the terminal company a percentage of that average amount for each message, the percentage decreasing as the average revenue per message increased. Subsequently a refinement of this arrangement was developed whereby terminal activities were divided into so called "originating" functions and "operating" functions, and separate sliding scale "schedules" were prepared for each of these activities. After allowance for these terminal costs the balance of the revenue was allocated between the carriers, substantially in proportion to the circuit mileage furnished by each entity involved.

While these schedules were probably designed primarily from a commercial point of view, as contrasted to a cost basis, there has nevertheless grown up over a period of years a certain acceptance on the part of the industry that the resulting commissions have broadly approximated average terminal expenses. Actually, of course, such a relationship could only have been accidental in any given case. More important, since terminal costs were never clearly defined until the agreed adoption of the station to station principle in 1943, it seems quite apparent that the older schedules, which presumably reflected the lower board-to-board basis of compensation, must have fallen far short of meeting average costs as they are presently recognized.

Meanwhile, and entirely apart from the now relatively settled problem of cost determination as such, new and even more serious complications have recently made their appearance—complications resulting primarily from the wide variation in the type of service rendered by the Bell System and the average Independent carrier. It is vital to understand, in this connection, that regards joint traffic, the Independent companies handle primarily the terminal functions, with line-haul operations ordinarily restricted to short haul feeder service. Purely Independent toll traffic, moreover, is also almost all short haul. By contrast the Bell System not only handles the bulk of the line-haul involved in messages terminated by the Independents, but enjoys practically exclusive operation of all the heavy volume long haul traffic between major industrial centers throughout the entire country. Under the circumstances, toll tariffs have been fixed almost entirely in relation to Bell system earnings, especially the earnings of the Long Lines Department.

AS already noted, early toll rates, being proportional to mileage, made no provision for terminal costs. This was not so important in the case of a long haul call, because the percentage of terminal costs to total costs was small. But in the case of short haul traffic, it developed that the terminal costs along might absorb practically the entire revenue originated. This situation has become particularly aggravated in recent years, due to the war-stimulated increase in long haul traffic to technological economies in the carriage of such traffic, and to the rate reductions that have been made as a consequence of the resulting large income gains to the Long Lines system of the American Telephone and Telegraph Company. Although these reductions have been primarily in the longer-haul brackets, they have nevertheless had a serious effect on Independent company revenues —first through a reduction in the average revenue per message upon which terminal compensation is based, and second through a direct reduction in the amount available for line-haul prorate. Note the illustrative example (I) on page 54 showing how a reduction of 40% in long haul rates may be translated into a 14% loss in connecting company revenues without the slightest regard as to the adequacy of such revenues in relation to expenses. As a matter of fact, the present contract arrangements automatically and arbitrarily reflect all such tariff changes without the consent or agreement (and oftentimes without the knowledge) of the connecting carrier.

This illustration, however, does not tell the whole story. While long haul

(Please turn to page 54)

Conducted by the
Observer and his Gang

THE Observation Tower

If you have observations or even a friendly bit of argument suitable for use in this column, you are invited to send them along, which automatically makes you a member of the Gang. You will be anonymous—no names of telephone people or telephone companies are used in this column. Address "The Observer," in care of TELEPHONE ENGINEER AND MANAGEMENT.

Building Better Pole Lines

GANG Member No. 28 complains to us that nobody ever does anything much about improving telephone line construction. Says he has been in the business a good many years and has built a lot of pole lines in that time and that with the exception of a few minor improvements, telephone pole lines are built just about the same way today that they were built twenty or thirty years ago. We called this Gangster's attention to the fact that the construction of telephone pole lines has changed in some important respects, such as for instance, the use of long span construction, which has been made possible by the development of high tensile strength wire. We also pointed out to him that the trend in telephone construction is to go underground where possible and that there have been important developments in buried wire, buried cable, etc., which should come under the head of improvements in construction.

He says he realizes all of this but what he is talking about is more particularly improvements in things that are used on pole lines regardless of the distance between poles, such as hardware, crossarm construction, guys, etc. He thinks there is a tendency in any business to oftentimes let well enough alone and not improve things that have become standardized by use.

We suggested to this Gangster that since he had a lot of experience in construction he should do some of this improving himself and get busy and think out new and better ways of building pole lines, or for that matter, of exchange construction. He said he would give it some thought.

Our private opinion is that if he works as hard on improving construction as he has in complaining to us we will have a new kind of pole line before long.

The vagueness of all of this reminds us of the story of the old lady to whom someone described the operation of radio when used in point-to-point conversations. It was explained to her that instead of using wires the radio conversation was carried through the air. She said she could understand that process all right but what she could not get into her head was how they fastened the air to the poles.

The Effect Of No Conventions

A QUESTION that has been bothering us is that of what effect there will be on the Independent telephone industry from its inability to hold conventions during the greater part of this year.

For a long time the telephone associations have (and we think correctly) been telling Independent telephone people that conventions are necessary to the continued progress of the industry. We think it is a fact that has been proven by experience. The convention has been not only a time for the renewal or maintenance of friendships, but also the time when the telephone man learns in a personal way what is going on in the industry and how the difficulties of the industry can be or are being dealt with. Undoubtedly the convention has been a source of inspiration to most of those in attendance and they have gone home from it not only with renewed vigor but also with many new ideas and a great deal of knowledge they would not have otherwise obtained.

This is true to even a greater extent when the convention is accompanied by displays by manufacturers of their latest equipment and other things useful to the business.

The United States Independent Telephone Association has announced that it will hold a "Convention by Mail," which we understand to mean that the reports of the officers and of the committees will be written up just as though they were to be presented to an assembly and then will be mailed to the membership for reading. This seems to be as good a plan as can be worked out when an actual assembly of people cannot be had. We do not believe, however (and, of course, the Association itself does not believe), that this plan is a real substitute for an actual convention. One reason is that the plan does not provide one of the essentialities of a successful convention, which is that of meeting people and verbally exchanging ideas with them, and of holding discussions regarding methods, procedures and difficulties.

"But, lady, this is a telephone."

We have the feeling that the absence of conventions would, if long continued, have a retarding effect upon the progress of the industry. We hope the time will come soon when telephone conventions can be resumed. We think they are a vital and integral part of the progress of the industry.

Telephone Authors

EACH month as we read the articles in Telephone Engineer and Management and Fortnightly Telephone Engineer which are authored by telephone men, we come more and more to the conclusion that a lot of telephone men are also good writers. We think this is not only a good thing for the industry but also a good thing for the writers.

There is a general assumption that the average businessman knows a lot but does not know how to tell what he knows in an interesting manner in writing. We believe this assumption is wrong. We think that on the contrary the average businessman has as much facility of expression in writing as people in other walks of life, and that it is a good thing for any industry if it has within it men who not only know things about the industry but also who can and are willing to express their knowledge in such manner that other people in the business can also have the benefit of it.

We say this is as good for the man as well as for the industry. The Editor tells us that this is a proven fact. He has pointed out a number of cases of, for instance, young men in the telephone industry who have reached prominence in it through becoming well known to the field by their writing on subjects of interest to the industry. According to his version, any up-and-coming young man in the telephone industry can advance his progress a great deal if he will write for the trade press.

There may be more to this than meets the eye: It is an old saying that if you want to learn all about a given subject, write a book about it. That is simply another way of saying, of course, that in order to write a book about any subject you have to study it yourself and do research work on it and find out what others are doing about the same thing, and so on, so that in the process of writing the book you must necessarily learn all that you can about the subject yourself.

This apparently means that men do not become prominent in an industry simply because they do writing about it. They become prominent in it because in order to do writing about it they must become practically an expert on the subject they write about, and it is a good thing for any man to become thoroughly posted on the subject that affects his business.

Our advice to the young fellow in the Independent telephone industry is, therefore, to do some writing about the industry. You'll find the trade press receptive, we think, and always willing and anxious to start a new writer on his way. These editors are, after all, a selfish bunch, and they have got to have writers in order to keep their magazines going. But what helps them also helps you.

Telephone Company Jigsaw Puzzle

THE time approaches when the telephone company managements will be face to face with certain puzzles of the business, such as:—

How much will our net toll revenue decrease after war activities have ceased?

How much will our Federal taxes decrease?

Will our operating and maintenance expenses continue to increase?

Many companies have made studies of these subjects but none of them, of course, have been able to arrive at a definite answer because most of these things are beyond the control of any management.

Further, there are many ideas about what is going to happen. For instance, hardly any two telephone men hold the same opinion as to the amount, if any, by which toll revenue will decrease now with the end of the war. We all know that such revenue is at an all-time high. Will it continue that high or will it go back to, or near pre-war levels, or will it stay somewhere between pre-war and present levels.

The question of operating and maintenance expense is another puzzle. If these costs continue to rise at the rate at which they have risen during the past three years, and if toll revenue should drop heavily, the situation might be difficult for many companies unless at the same time Federal taxes also drop heavily.

These are simply some of the puzzles with which the management of telephone companies are now confronted. These are what might be called the reconversion problems of the telephone operating industry. Smart managements are trying to figure out now what those things will be doing to their companies presently.

"Boy, did our equipment stand up!"

Telephone Engineer's RADIO COURSE FOR TELEPHONE MEN

Chapter 5, Section 2

By B. C. BURDEN
Technical Consultant
Lincoln, Nebraska

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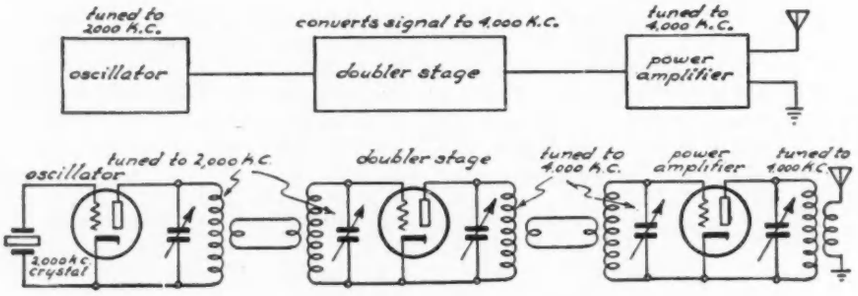

Fig. 58—Use of crystal frequency double stage.

Frequency Multiplication Stages

THE frequency of a quartz crystal depends primarily on its thickness. Crystals which operate at frequencies as high as 20 to 30 megacycles are available. In most cases, however, crystals of much lower frequency are used even though the operating frequency may be substantially higher. This is because of the fragile character of the high frequency quartz crystals and their lower energy capabilities.

In order to utilize crystal control at the higher frequencies, as for example those that will be employed in connection with telephone and railroad radio applications, it is necessary to resort to what is known as *frequency doubling* or *frequency multiplication.* This consists of a circuit arrangement whereby a crystal is used as the controlling or driving element and its *harmonic frequencies* rather than the fundamental frequency are selected by means of tuned circuits and amplified.

It is thus feasible to build up the relatively low frequency of the controlling crystal to almost any desired multiple (harmonic) frequency thus giving crystal control operation even though the operating frequency may be substantially higher than the crystal frequency.

How Frequency Multiplication Works

ALL vacuum tubes when used as oscillators normally have harmonic frequencies generated in the output circuit. For example, a crystal oscillator tube operating at a fundamental frequency of 2000 kilocycles would have present in the output circuit, harmonic frequencies of 2, 3, 4, etc. times the fundamental frequency. For example the second harmonic of a 2000 kilocycle crystal frequency would be 4000 kilocycles; the third harmonic would be 6,000 kilocycles, etc. These harmonic frequencies although not nearly as strong as the fundamental can be built up with amplifying stages.

Fig. 58 shows how a 2000 kilocycle quartz crystal can be used to generate a 4000 kilocycle output frequency. This is accomplished by selecting the second harmonic in what is referred to as the *doubles stage.* In the typical transmitters such as are being used in military operations and which operate at frequencies in the vicinity of 100 megacycles, it is customary to use crystal frequencies as low as 1000 kilocycles. In one typical transmitter, for example, a 1000 kilocycle crystal goes through one tripler stage, one quadrupler stage and three other stages in order to produce the desired 100 megacycle output frequency.

Use of Vacuum Tube Oscillator In Radio Receiver Circuits

THE foregoing discussion has been concerned largely with the use of oscillators in radio transmitters. The oscillator is an essential element in virtually all radio receivers. Most present-day receivers are of the superheterodyne type. This requires the

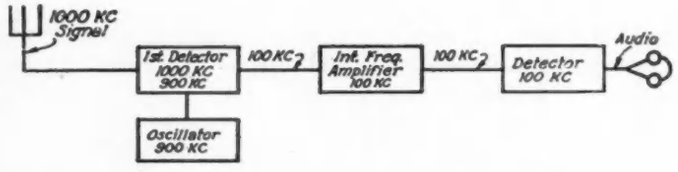

Fig. 59 — Block diagram showing use of oscillator in super-heterodyne.

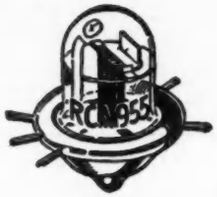

Fig. 61 — Acorn tube designed for use at the higher frequencies.

use of locally generated oscillations which are used to feed or heterodyne the incoming signal to some fixed *intermediate frequency*. The vacuum tube oscillator used in radio receiver circuits of necessity must be variable, hence crystal control cannot be used. The oscillator circuits are similar to those previously described and are so designed as to have little frequency drift.

Fig. 59 shows in block form how an oscillator is used in a super-heterodyne receiver.

Basic Theory of Vacuum Tubes

DUE to space limitations it will not be feasible to discuss at length the detailed theory of vacuum tubes. Many books are available on this subject and TELEPHONE ENGINEER has in past years carried training courses dealing with the operation of vacuum tubes. The following discussion on tubes is intended to merely high-spot some of the general features of tubes for the benefit of those who are not familiar with their operation yet do not desire to go into this subject in more detail.

Vacuum tubes are classified as diodes, triodes, tetrodes and pentrodes according to the number of elements. The element arrangement of various types of tubes is shown in Fig. 60. Common types of vacuum tubes may be considered as consisting of: (1)—a source of electrons, (2)—one or more control elements, (3)—a terminating or plate element. In addition to these basic elements some tubes have additional elements which serve to increase their efficiency and usefulness.

Tube Frequency Limitations

VACUUM tubes have well defined operating limits with respect to both frequency and power. At frequencies above 50 megacycles it is generally necessary to use special tubes whose construction is somewhat different from that of the customary types. Fig. 61 illustrates what is known as the *acorn type* of tube which is useful at the higher frequency and which is characterized by its small size and its low interelectrode capacity.

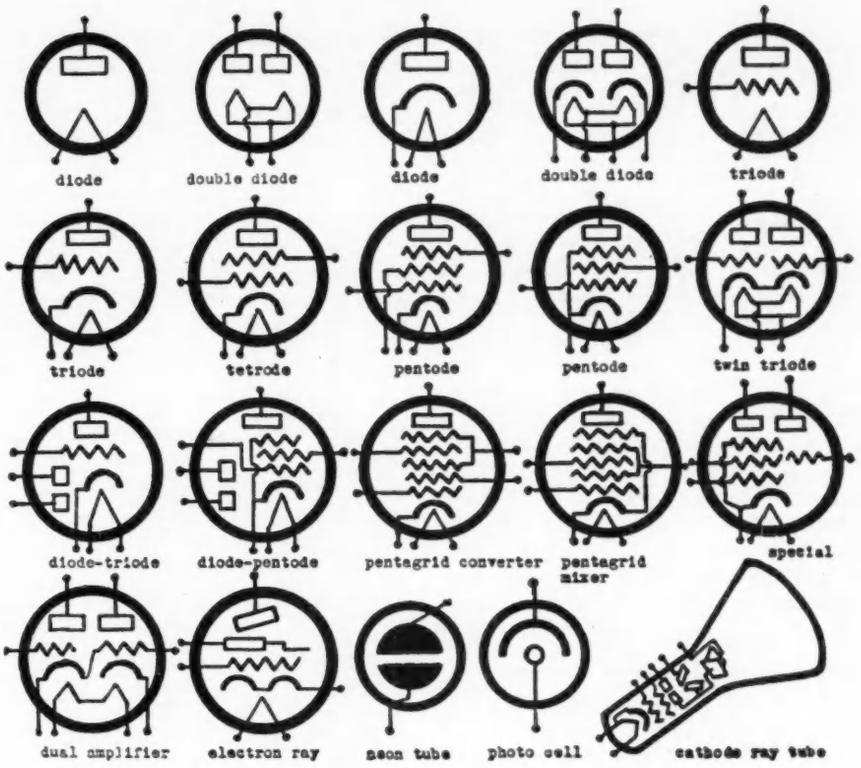

Fig. 60—Schematic representative of various types of tubes.

At frequencies above 1,000 megacycles radically different types of tubes are required because of the extremely short wave lengths involved. The Magnetron, the Klystron and the Light House tubes are all adapted for the ultra and super high frequencies. Because of their special nature their theory and use will be discussed in a later part of this course.

The Diode Tube

DIODE tubes are used primarily in electronic circuits as rectifiers and detectors of radio waves. The basic action of a high vacuum type of diode tube is illustrated by Fig. 63 and is as follows: Negative electrons are thrown off by the heated filament and are attracted by the positively charged plate. These electrons pass from the filament to the plate and then through the external circuit in the direction shown by the arrow. It will be noted that the direction of electron movement is opposite to the common conception of current movement in an electrical circuit, i.e., current is normally considered as moving from positive to negative whereas actually electrons move from negative to positive.

If the plate has a negative charge with respect to the cathode (or filament), the negative electrons are repelled and no current flow takes place as is shown by Fig. 64. A diode tube can therefore be used as a rectifier of alternating current or a detector of radio waves.

If for example a source of 110 volt 60 cycle current is connected as shown in Fig. 65, the positive half cycle of the input wave will attract electrons from the filament to the plate and a current flow will take place; but the negative half cycle will repel the electrons; hence there will appear in the plate circuit a pulsating current flow as is shown by the curves in Fig. 66. Diodes are used in some radio receiving circuits. They are also extensively used as a rectifier for battery charging

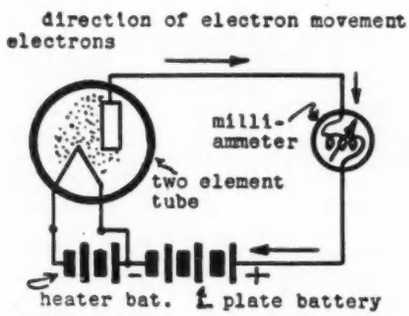

Fig. 63—Basic action of a diode tube (plate positive).

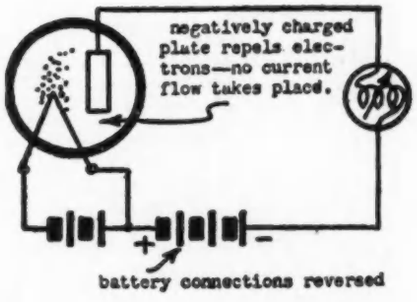

Fig. 64—Basic action of a diode tube (plate negative).

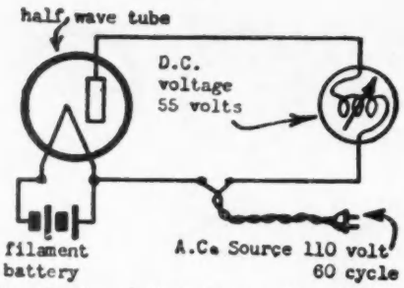

Fig. 65—Use of diode to convert a-c to d-c current.

purposes. When used for power rectification the diode tube is usually evacuated and filled with an inert gas which increases its power handling capacity as the result of the secondary emission effect which takes place. This is due to the negative electrons which, in travelling from the filament to the plate, collide with gas molecules and thus create additional or *secondary electrons* which augment the initial current.

Operation of Triode Tubes

THE grid of fine wires interposed between the plate and cathode (or filament) of a vacuum tube can be used to control and regulate the electronic current flowing from the cathode to the plate. Because it is located closer to the cathode than to the plate, it has a "lever effect," that is, a small amount of power applied to the grid circuit can control a much larger amount of power in the plate circuit. It is this remarkable feature of triode tubes on which the electronic arts of today have been developed. The mathematical concept of operation of a triode vacuum tube is complicated but for all practicable purposes we can regard the action somewhat as follows: When the voltage applied between the control grid and cathode of a triode tube is negative, the electrostatic charges tend to repel the negative electrons travelling to the plate and thus reduce the plate current. If the grid is made positive or less negative with respect to the cathode, it tends to increase the number of electrons flowing to the plate. The effect of a grid input voltage of two volts applied to a triode on the plate current of a triode tube is shown in Fig. 67.

Grid Bias Voltage

IN the operation of multi-element vacuum tubes as oscillators, detectors or amplifiers it is necessary that the control grid be maintained at some fixed voltage with respect to the cathode. This voltage is usually such that the grid is negative by one or more volts. For example in Fig. 67 the tube

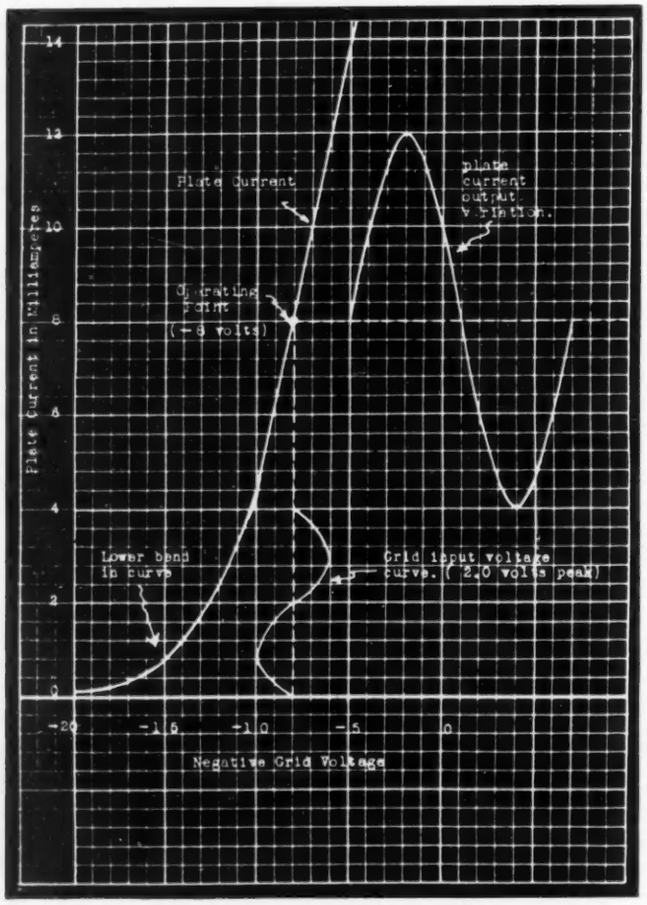

Fig. 67 — Curve showing effect of 2 volts (a-c) applied to the grid of a triode amplifier.

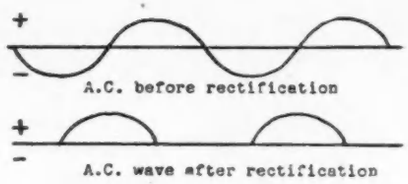

Fig. 66—Curve showing pulsating d-c current produced by rectifying action of a diode.

is operated at a negative 8 volts with respect to the cathode. This is referred to as the *operating point.*

The input voltage causes this net voltage on the grid to shift to a higher and to a lower value as is shown. This is an important phase of vacuum tube theory and should be properly understood. Tubes which are operated with incorrect bias voltage may fail to amplify and detect and will usually produce distortion. Audio amplifiers and radio frequency oscillators are operated on the straight portion of the characteristic curve (class A operation). Detectors are generally operated on the lower bend of the curve. A study of the grid voltage plate current curve shown in Fig. 67 will clarify the picture of how plate current varies with grid voltages of different values. As the voltage on the grid is gradually increased in a negative direction, the plate current reduces until it reaches zero. At first it decreases in a linear manner and then begins to flatten off. The point at which the current flattens off is known as *the lower bend of the curve.* Likewise if the voltage is gradually increased in the positive direction, the plate current increases in a linear manner until it reaches some limiting value at which it begins to flatten off due to forming the upper bend of the characteristic curve.

The Vacuum Tube Is A One Way Device

AS was previously mentioned in this course a vacuum tube is a *one-way device* and unlike repeating coils, induction coils and other com-

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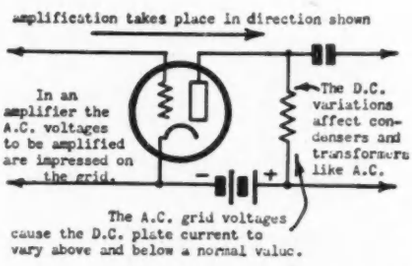

amplification takes place in direction shown
In an amplifier the A.C. voltages to be amplified are impressed on the grid.
The D.C. variations affect condensers and transformers like A.C.
The A.C. grid voltages cause the D.C. plate current to vary above and below a normal value.

Fig. 68—d-c pulsating current in plate circuit of a vacuum tube is converted to a-c by action of transformer or coupling elements.

Personalities

B. G. Halstead, attorney for the Indiana Bell Telephone Co., has been elected secretary treasurer of that company. He succeeds **J. R. Ruddick,** Indianapolis, who retired on July 1.

●

Colonel V. Richard Pogue, until wartime connected with the New York Telephone Co., died from heart failure during May while in Germany. He was with the First Army as Executive Signal Officer and was responsible for the entire communications of the First Army.

●

Mr. and Mrs. Victor Kilstrom have sold the telephone exchange at Rayville, S. Dak., to a **Mr. and Mrs. O'Neal** of Fedora.

●

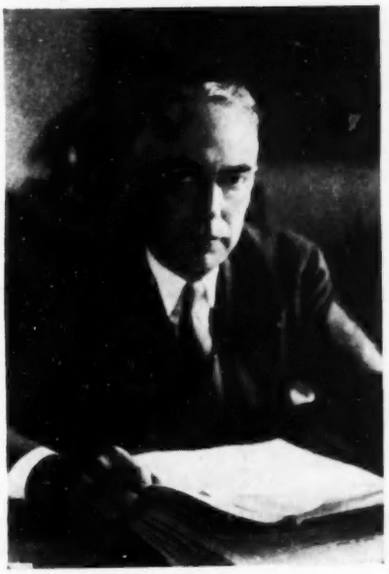
A. J. Harty began as assistant to the general manager of the Nebraska Continental Telephone Co., Columbus, Nebr., on July 1.

●

Mrs. D. H. Holmes, former assistant to the editor but now living in San Francisco with her chemical engineer husband, writes us the following "Seen on the San Francisco-Oakland Bridge July 30—An **Autocar** truck with the emblems of the U. S. Navy emblazoned on its side and carrying a full load of reels of **General Cable Company** cable. TELEPHONE ENGINEER advertisers all out for victory."

●

Verne B. Clark, district manager of the Middle States Telephone Co., Pekin, Ill., is our reporter for details on the Grass Roots Rural Telephone Conference held recently. The meeting was very successful and will no doubt be repeated in other portions of the state. **Verne** served as host and chairman to the initial meeting held under the auspices of the Rural Service Committee of the Illinois Telephone Association, of which **Harry Bates** of Dixon, Ill., is chairman.



FCC Comm. W. H. Wills

FCC Commissioner William H. Wills, former governor of Vermont, took his oath of office as a member of the Federal Communications Commission July 23 to succeed **Norman S. Case.** He was appointed June 13 by President Truman and was confirmed by the Senate July 12.

●

Edward Raber, president of the Dunlap (Ind.) Mutual Telephone Union, petitioned the Indiana Commission for an increase in rates for that exchange during July. The exchange serves 450 subscribers and seeks a rate of $2.50 for private business, $2 for private residence and $1.50 for party line.

●

Garland B. Foscue, president of the Independent Pioneer Telephone Association, reports that association in good financial shape with an ever increasing membership. Preparations for annual meeting have been held up because of no national convention this year and a director's vote by mail is now in progress.

R. I. Gilleland of Danville, Ill., started July 1 as the new manager of the Hoopeston (Ill.) Telephone Company. He formerly was manager of the old Vermilion County Telephone Company that later was purchased by the Bell. **Gilleland** is coming out of retirement to handle the Hoopeston property and has moved to that city.

●

W. R. Boyd, Springfield, Ill., has been appointed a labor member of the National Telephone Commission. Appointment was made by **Pearce Davis,** chairman of the commission. **L. F. Shepherd**, vice president and general manager of the Illinois Commercial Telephone Co., Springfield, is an industry member of the commission.

●

K. W. Canady, manager of the Madison Telephone Exchange, Madison, Kan., has notified us they had traded on June 1 the exchanges at Lansing and Monticello, Kansas for the Madison exchange. **H. A. Morrison** is assistant manager.

●

F. V. Rhodes, secretary of the California Independent Telephone Association, made a comprehensive report to the board of directors' meeting of that group held in Santa Monica, July 12. No meeting was held in 1944 and vote by mail was used to fill terms of directors whose terms were expiring. **C. F. Mason** is president.

●

J. T. Naylor, vice president of Associated Telephone Company, Ltd., Santa Monica, Calif., and secretary of the Pacific Coast Telephone Committee on Intercompany Settlements and the Pacific Coast Independent Telephone Committee on Rural Service, joint committees of the Oregon, Washington and California association, reported at the joint meeting held in Los Angeles, July 9, 10, 11 and 12.

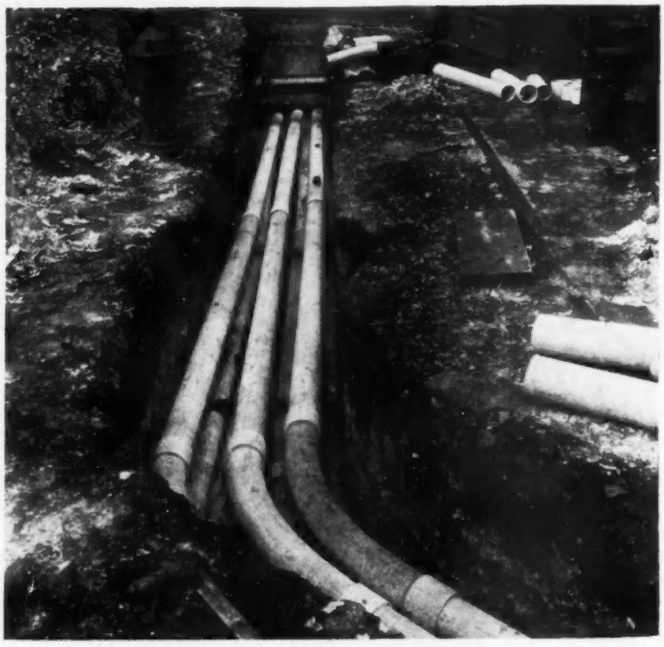


Fig. 6 — Asbestos-Cement Tubular Duct Installation (Courtesy Johns-Manville Company)

Underground CONDUIT Construction

By GEORGE W. STACEY
Technical Engineer

THE increasing cost of labor makes it imperative that telephone plant be so designed and constructed as to reduce maintenance man-hour requirements to a minimum. It may well be that the current trend toward higher labor costs will result in a greater use of underground cable plant.

If properly designed and built, underground cable plant has exceptionally long life and maintenance charges are unusually low. The difference in the annual charges for underground plant as compared to aerial plant is as much as eight to twelve percent.

Underground cable plant is, under the construction methods commonly employed, substantially higher in first cost than aerial cable plant. Many plant engineers contend that underground cable plant cannot be economically justified except where the cable pair capacity (2—600 pair cables) of an aerial pole line is exceeded.

This article discusses the general features of underground conduit construction and suggests lines of approach to the problem of reducing underground conduit costs to the point where this type of plant can be "proven-in" even in the smaller exchanges.

Problems Involved in the Use Of Underground Cable Plant

THE principal advantage of underground cable plant lies in its freedom from wear and from service interruption due to storm damage. These advantages are partially offset in the case of underground exchange distribution cables due to the necessity for having one or more subscriber drop termination points in each city block.

The use of underground cable and aerial drops solves the problem of greater cable life and reduced maintenance costs for the cable itself but still leaves us with the problem of high annual charges for the subscribers' drops. In fact, the drop maintenance problem is slightly aggravated with underground cable as it is generally considered desirable to keep the number of terminals and cable riser poles per block to a minimum, consequently there is a tendency to use fewer terminals than would be the case with aerial cable. This latter problem requires development of low cost manholes and satisfactory methods of burying drop wire.

An Underground System For the Small Exchange

IN considering the application of underground cable in the average exchange plant as a means of reducing plant maintenance costs, it would seem that buried cable without conduit protection, could be used in a supplementary way with cable in underground conduit. The availability of both the jute-protected and the steel armored jute-protected cable offers a medium whereby cable can be placed underground with assurance that sheath corrosion will not develop into a problem which will offset the advantages

gained from the use of underground cable plant.

In the opinion of the writer the ideal underground cable plant will be one which utilizes a combination of cable in underground conduit and cable (jute-protected) buried directly in the ground. The conduit portion of such a plant would carry the main feeder cables, toll entrance cables. The jute-protected buried cable would be used only for the smaller distribution cables located on permanent routes and of such size as to care for the ultimate requirements of a given block or series of blocks.

The Problem of Lower Cost U.G. Plant

AT the outset it seems apparent that an approach to the problem of providing a satisfactory lower cost underground cable plant will require solution of the following factors:

1.—Development of low cost multiple-duct installations which are easy to install.

2.—Design of simple and inexpensive pre-fabricated manholes.

3.—Development of a machine for making a "slot trench" to permit easy installation of the subscribers' underground drop.

4.—Development of a low cost drop wire which can be buried directly in the earth and which will have life comparable to that of the underground cable.

Duct Design for Small Exchanges

WHEN a number of ducts are required along a given route, the current practice is to use either short lengths of vitrified multiple-tile duct (see Fig. 1) or to use longer lengths of fibre or asbestos cement tubular ducts as shown in Fig. 2.

Duct runs of either of the two types may be encased in concrete or used with concrete bases or caps. This type of construction is relatively expensive and, although suitable for heavy cable runs in the larger exchanges, does not solve the problem for the smaller plants that could reduce maintenance costs with a complete underground cable plant provided satisfactory underground duct runs could be made for the main feeder cables at a fairly low cost.

It has been suggested that an approach to this problem might be to use ten foot lengths "small diameter" tubular conduit arranged in units of say two, three or four ducts and which could be readily coupled together and laid with or without a small amount of concrete top protection. The fact that 26 gauge cable (or even 28 gauge) can be used in the average small exchange particularly for the relatively short feeder cables would obviate the necessity for the 3¼" diameter ducts which are customarily employed in telephone underground conduit systems. In other words, why use a duct with an inside diameter of 3¼ to 4 inches when one having a diameter of only 1½ to 2 inches will handle all the pairs normally needed, along a given feeder route? Certainly the smaller diameter duct should result in lower material costs.

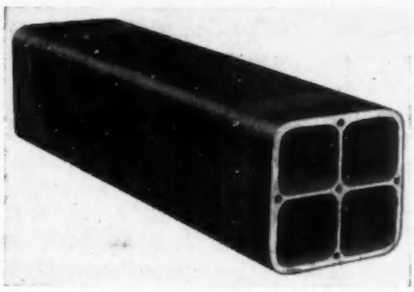


Fig. 1—Four-way Vitrified Clay Conduit. (Courtesy National Fireproofing Co.)

Fig. 2 — Tubular Fibre Duct. (Courtesy Line Material Co.)

Need for Multiple Duct Runs

IT is practicable to design exchange cable plant so that the initially placed cables will care for circuit requirements over a long period of time. It might therefore seem that there would be little or no demand for a multiple duct run in the smaller plants. Although it is true that pair requirements can be predicted with reasonable accuracy for a considerable period into the future there is the need for at least one spare duct along a given feeder route to permit the ready replacement of a section of cable in the event of cable failure. The additional duct also serves as insurance against unanticipated circuit demands in a given area.

It would seem that ten foot lengths of tubular duct units having either two or three ducts would offer the greatest field of use in the small exchange plant. No particular manufacturing problems would be involved as it would be only necessary to provide simple spacing blocks and some method of strap binding to hold the several ducts rigidly together thus facilitating their installation. Once in the ground the earth would keep them together.

Needed a Baby Trenching Machine

THE installation of the small diameter multiple duct runs in the small exchange would be facilitated by a small low cost trenching machine. Assuming that duct diameters of two inches were satisfactory it is conceivable that a trench for the multiple duct runs of the type normally required in the small exchange would be kept to three to five inches in width. A machine capable of digging a trench from 2 to 4 feet deep and powered by a small gas engine would meet the needs of the trenching problem. Although small size trenching machines are already on the market, most of these are designed for sewer and water pipe construction and are not what is needed.

If a machine of the type just described could be made available at a cost of say $400 to $500, it would be feasible for a company operating a number of exchanges to have a single machine and ship it around from point to point as needed. The smaller single unit telephone companies could go to-

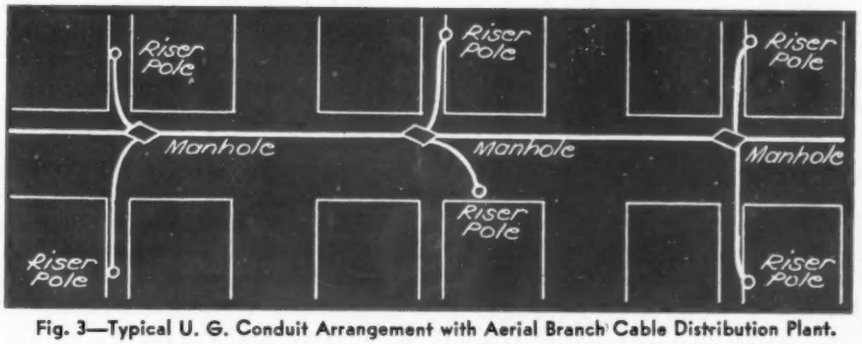


Fig. 3—Typical U. G. Conduit Arrangement with Aerial Branch Cable Distribution Plant.

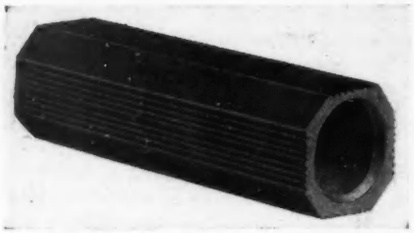


Fig. 4 — One-way Vitrified Clay Conduit (Courtesy National Fireproofing Company)

gether and purchase a machine of this type and use it on a cooperative basis much in the same manner as farmers jointly own and use a single piece of expensive machinery.

The Low Cost Manhole Problem

THE problem of low cost manholes also represents a difficult problem requiring solution if the smaller Independent plants are to be placed underground. Brick and concrete manholes are expensive and generally require skilled labor to build. Their size and general arrangement are based on the thought that they should be large enough to permit a splicer to work in comfort. If we examine the manhole problem with respect to providing a low cost manhole which will prove satisfactory for use with a small exchange underground conduit system we find that: (1) the size of the manhole required can be reduced materially on the theory that splicing operations are so infrequent that somewhat less space than would normally seem desirable would prove satisfactory.

Small size manholes are not uncommon in plants of the larger companies and are known as **handholes or service boxes.** Various types are used, one being 3 feet x 4 feet with 3 feet 2 inches of headroom as compared to a typical manhole having dimensions of 3 feet 6 inches x 8 feet with 5½ feet of headroom. Service boxes are required at the junction of branch and feeder cables, at corners and possibly at the location of each distribution terminal.

Fig. 5—Multiple-Tile Conduit Installation.

These small size manholes could be made either of pre-cast concrete, large sewer tile, or possibly a creosoted wood or sheet steel frame. If, in our search for lower cost underground conduit plant, we are courageous and depart from orthodox methods we see no reason why still simpler and less expensive shallow service boxes cannot be designed on the basis that splicing operations are usually required only at the time of cable installation and can be handled in an excavation made for this purpose and a shallow service box set around the spliced cables and used to terminate the ducts after the splicing is completed.

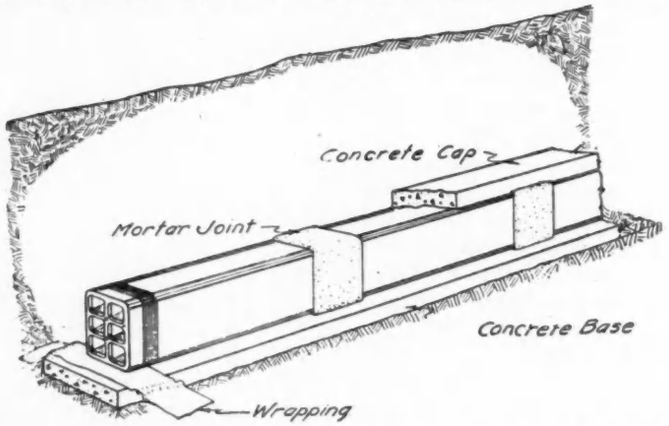


Fig. 7 — Method of Installing Multiple-Tile Duct. (Courtesy National Fireproofing Company)

The Subscriber's Underground Drop

THE principal problem confronting the plant engineer contemplating an underground cable plant is "how can the subscribers' drops be handled?" Obviously, it is highly desirable that they be placed underground in order to reduce the high maintenance costs and short life of overhead drop wire. If drops are to be placed underground we are confronted with: (1)—the problem of a suitable low cost drop wire material which will not deteriorate in the soil, and (2)—the problem of trenching between the cable terminal and the subscriber's residence. The problem of a long life drop wire is less complicated than the matter of low cost trenching. Drop wire of the "buried type" is already on the market and has given a fairly satisfactory account of itself. The use of plastics to provide a tough long life covering which will also offers possibilities.

The matter of digging the trench is a horse of another color.

A trench but little wider than the wire itself is needed but dug by hand a minimum width of 5 to 6 inches is usually necessary and this means the high labor costs. Drop wire can be pulled into the ground by means of a wire laying plow but this method is hardly suitable for the average city drop installation. Only one alternative seems feasible, namely: a slot-digging machine operating with a small gasoline motor and small and flexible to permit running it through yards. It could be pushed or guided by means of a pair of handles similar to those of a garden cultivator. Here is a development problem for the machinery manufacturer who is looking for new products for the postwar market.

It is apparent that the installation of subscribers' drop will take longer if placed underground than when placed overhead. This increased initial cost would be offset by the freedom from future maintenance troubles particularly tree wear, low insulation at drop wire clips, etc.

Selection of Conduit Route

THE route selected for an underground conduit run should be one which offers the most direct feed to the areas served. Paving and other considerations may necessitate a route, which though less direct, will offer fewer complications. A conduit system consists essentially of: (1)—main duct runs, (2)—lateral or branch duct runs, and (3)—manholes and handholes. The manhole locations are determined by branch points, corners, underground terminals, length of pull, etc. Most duct runs are kept to 700 feet or less although it is feasible to use duct runs as long as 1000 feet with the smaller size cables and when the cables are properly lubricated before being

(Please turn to page 72)

Telephone Company Sponsored Army Units Receive Recognition

By ROLAND DAVIES

THE Affiliated Plan of the Bell System and Independent telephone industry with the Army under which trained technical personnel were mobilized under a program established by these branches of the industry with the War Department long before hostilities began received recognition from the War Department last week, along with affiliated units in other technical fields, and the decision was made that the affiliated units will go on a reserve status when the Army is demobilized after this war.

The telephone industry, Bell System, Independents and Western Electric Co. had furnished 122 different units of which six have become inactive or have been disbanded. The following constituted the distribution between the various services of the Army—Air Forces, 47; Signal Corps, 42 with three disbanded; and Ground Forces, 33 with three inactive.

The Affiliated Plan made possible the orderly conversion of the nation's technical manpower from peace to war at a time, the War Department stated, when the requirements of both industry and the Army greatly exceeded the availability of such skills. The sponsoring telephone companies initiated the recruitment of personnel into the various specialized units.

The Bell System and the Independent industry had worked closely with the Army since World War I, when the telephone industry through the Bell System had effected a similar program of trained personnel recruitment. This plan was an integral and most valuable part of the Army's preparedness during the interim between World War I and World War II and was very effectively formulated in the peacetime studies of preparedness. Brigadier General Carroll O. Bickelhaupt, Vice President of the American Telephone & Telegraph Co. and Senior Reserve Officer of the Signal Corps during the peacetime years, directed the Bell System phase of the Affiliated Plan programming and Colonel W. C. Henry, General Manager of the Northern Ohio Telephone Co., was in charge of the program for the Independent industry. In the recruitment of the units, General Bickelhaupt and Colonel Henry divided the United States and organized units through conferences.

Because the affiliated units have rendered such meritorious service and many of their sponsors have expressed the hope a similar relationship could be preserved in the postwar military establishment, the War Department has adopted the following statement of policy:

"It will be the policy of the War Department to preserve affiliated units and sponsored units for possible use in the postwar Army. Continued sponsorship of units by business firms and institutions during the postwar period will not only preserve interest in national security, but will also speed the reactivation of units wherever necessary. Moreover, the historical continuity of these units will be assured if they are inactivated rather than disbanded. This should materially enhance the pride of the sponsoring organization in its unit. Affiliated units will become a part of the reserves."

The various affiliated units are shown by companies as follows:

Affiliated Units by Companies

American Telephone & Telegraph Co., Long Lines Dept.

Signal Corps:	249th Signal Operations Co.
	821st Signal Wire Maint. Co. (Disbanded)
	843rd Signal Service Battalion
Air Forces:	574th Sig. AW Bn.; 1058th Sig. Co. Sv.G.

Associated Telephone Co. (Calif.)

Ground Forces:	217th Signal Depot Company

Bell of Pennsylvania

Ground Forces:	178th and 187th Signal Repair Company
	187th Signal Repair Company
Air Forces:	559th Sig. AW Battalion
	1072nd Signal Co. Service Group
	81st Signal Plat., AB
	1085th Signal Co. Service Group
	435th Sig. Bn. Construction
Signal Corps:	3rd Signal Battalion
	33rd Signal Construction Bn.
	241st Signal Operations Co.
	812th Signal Service Company

Bell of Pa. and A. T. & T. Long Lines Department
Signal Corps: 95th Signal Battalion (Disbanded)

California Independent Telephone Association
Ground Forces: 244th Signal Operations Co. (Inactive)

Central Group Operating Co. of General Telegraph Corp.
Signal Corps: 32nd Signal Construction Battalion
245th Signal Service Company

Chesapeake & Potomac Telephone Co.
Air Forces: 573rd Signal AW Battalion
Signal Corps: 31st Signal Lgt. Constr. Battalion
811th Signal Service Company

Cincinnati and Suburban Bell Co.
Air Forces: 571st Signal AW Battalion

Illinois Bell Co.
Ground Forces: 59th Signal Battalion
65th Signal Battalion
303rd Signal Operations Battalion
189th Signal Repair Company
Air Forces: 1065th Signal Co. Service Group
84th Signal Plat., AB
417th Signal Bn., Air Force
438th Signal Bn., Construction
Signal Corps: 30th Signal Hvy. Constr. Battalion
188th Signal Repair Company
230th Signal Operations Co.
813th Signal Service Company
818th Signal Service Company

Iowa Independent Telephone Association
Ground Forces: 219th Signal Depot Company

Kansas Telephone Association
Ground Forces: 218th Signal Depot Company

Michigan Bell
Ground Forces: 96th Signal Battalion
Air Forces: 561st Signal AW Battalion
Signal Corps: 814th Signal Service Company

Mountain States Tel. & Tel. Co.
Air Forces: 1062nd Signal Co. Service Group
Signal Corps: 28th Signal Heavy Constr. Battalion

New England Tel. & Tel.
Ground Forces: 68th Signal Battalion
93rd Signal Battalion
Air Forces: 555th Signal AW Battalion
1079th Signal Co. Service Group
83rd Signal Plat., AB
Signal Corps: 97th Signal Battalion
816th Signal Service Company

New Jersey Bell
Ground Forces: 67th Signal Battalion
98th Signal Battalion
Air Forces: 80th Signal Plat., AB
420th Signal Co., Avn.
Signal Corps: 35th Signal Constr. Bn.
179th Signal Repair Company

New York Telephone Company
Ground Forces: 51st Signal Battalion
66th Signal Battalion
94th Signal Battalion
99th Signal Battalion
301st Signal Opn. Battalion
302nd Signal Opn. Battalion
310th Signal Opn. Battalion
Air Forces: 1056th Signal Co. Service Group
1069th Signal Co. Service Group
1073rd Signal Co. Service Group
1078th Signal Co. Service Group
82nd Signal Plat., AB
85th Signal Plat., AB
913th Signal Co., Dept. Avn.
418th Signal Co., Avn.
433rd Signal Bn., Constr.
926th Signal Bn., Tactical Air Command
927th Signal Bn., Tactical Air Command
Signal Corps: 36th Signal Construction Battalion
38th Signal Construction Battalion
229th Signal Operations Company
243rd Signal Operations Company
815th Signal Service Company
817th Signal Service Company
805th Signal Service Company

Northwestern Bell
Ground Forces: 304th Signal Opn. Battalion
Air Forces: 556th Signal AW Battalion
1057th Signal Co. Service Group

Ohio Bell
Ground Forces: 69th Signal Battalion
305th Signal Opn. Battalion
Signal Corps: 34th Signal Construction Battalion
180th Signal Repair Company

Ohio Independent Telephone Association
Ground Forces: 92nd Signal Battalion
Signal Corps: 39th Signal Constr. Battalion

Pacific Telephone & Telegraph
Ground Forces: 309th Signal Opn. Battalion (Inactive)
Air Forces: 568th Signal AW Battalion

Penna. Telephone Corp., Erie, Pa.
Signal Corps: 246th Signal Operations Co.

Southern Bell
Air Forces: 557th Signal AW Battalion
566th Signal AW Battalion

Southwestern Bell
Ground Forces: 308th Signal Opn. Battalion (Inactive)
Air Forces: 903rd Signal Co. Depot Avn.
1059th Signal Co. Service Group

Western Electric
Ground Forces: 210th Signal Depot Co.
213th Signal Uepot Co.
214th Signal Depot Co.
Air Forces: 901st Signal Depot Co. Avn.
902nd Signal Depot Co. Avn.
903rd Signal Depot Co. Avn.
904th Signal Depot Co. Avn.
905th Signal Depot Co. Avn.
906th Signal Depot Co. Avn.
907th Signal Depot Co. Avn.
908th Signal Depot Co. Avn.
Signal Corps: 205th Signal Depot Company (Disbanded)
206th Signal Depot Company
207th Signal Depot Company
208th Signal Depot Company
296th Signal Installation Co.
297th Signal Service Company
298th Signal Service Company
299th Signal Service Company

Wisconsin State Telephone Association
Ground Forces: 215th Signal Depot Co.
216th Signal Depot Co.

Wisconsin Telephone Co.
Air Forces: 432nd Signal Bn. Construction

COOK TYPE UX

Cable Terminal

Designed to facilitate installation and service in manhole termination and distribution of underground cable systems, the Type UX Cable Terminal (unprotected) combines many features which have made it popular with telephone men everywhere.

The lateral cable enters through a well in the cable chamber into which solder is puddled so that a strong, moisture-proof connection is made. A patented metal strap on the mounting bracket clamps the cable to prevent injury to the cable at the joint between the cable and terminal. The terminal may be mounted with cable stub out of top or bottom.

The terminal provides for service outlets. These outlets in the sides of the terminal are sealed with a brass pipe plug having a 3/8" pipe thread. Lead sheath of instrument distribution cables are terminated in heavy brass stuffing boxes set in the service outlets. The face plate is made of a single piece of moulded bakelite of great strength, low moisture absorption, and high electrical resistance under all conditions.

ARMY E NAVY

COOK ELECTRIC Company

Telephone Protection & Distribution Engineering Since 1897

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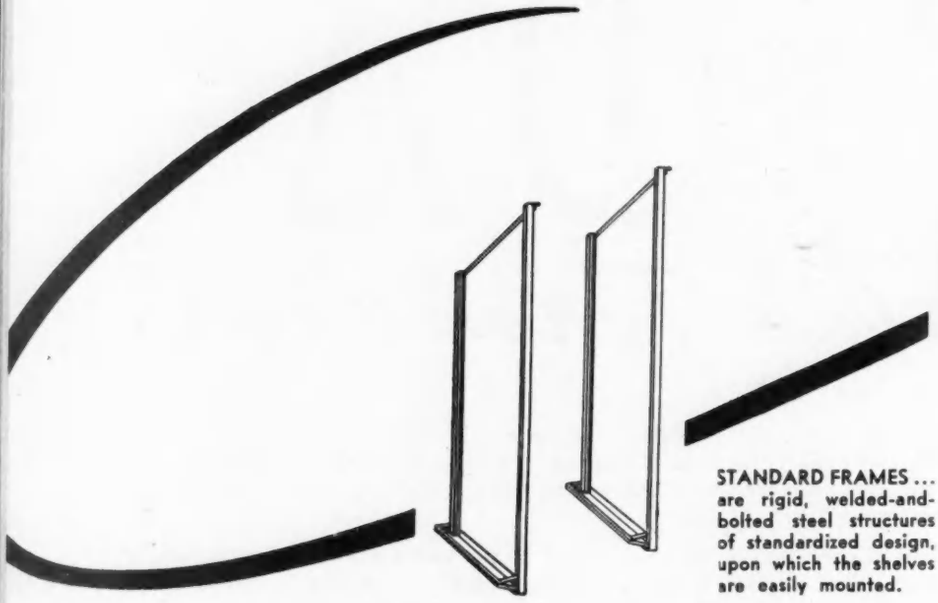
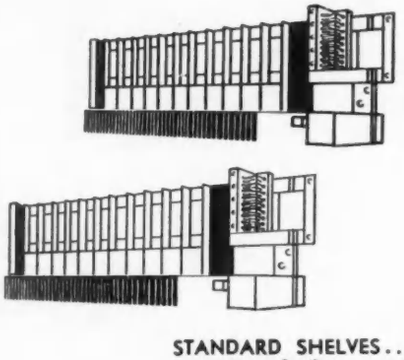
Prepare for Growth . . .

with *Strowger*

Automatic Telephone Equipme



STANDARD FRAMES . . . are rigid, welded-and-bolted steel structures of standardized design, upon which the shelves are easily mounted.



STANDARD SHELVES . . . provide mounting facilities and switch jacks, with all wiring completed to a terminal block at the end of each shelf.

Isn't it logical, when you convert your property to automatic operation, to prepare also for future e nsion? wise to be sure that your new equipment will be ***ready to grow***—at minimum cost, without fuss o bother, re-arrangement or re-wiring?

You're sure of all this when you install Strowger Automatic Telephone Equipment. For this equipme is desi growth—engineered specifically for easy, trouble-free expansion. On its standardized frames are moun switc of various standard types. On these shelves, in turn, individual switches are quickly "jacked in" as eeded. expand your exchange, you merely slip new switches into place on existing shelves. For further gro , you shelves or new frames with equipment as required. No matter how large the addition may be, existi equipr wiring are ordinarily not disturbed.

The ease with which Strowger Automatic Telephone Equipment may be expanded and re-arranged s prov one of its most valuable features for practical telephone men. Install Strowger Automatic, and you' ways growth.

AUTOMATIC ELECTRIC

Originators and Developers of Strowger Step-by-Step Machine Switching Automatic Dial System
Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

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AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.
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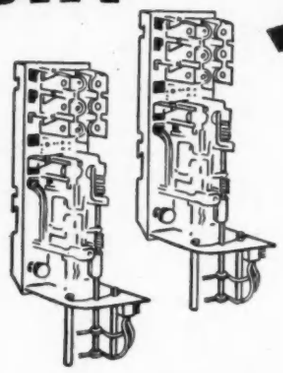
pment



STANDARD SWITCHES . . . each comprising a complete switch mechanism with associated relays —wired, and with wiring terminated on a "jack" on the base.

ure e nsion? Isn't it
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n" as eeded. . . . To
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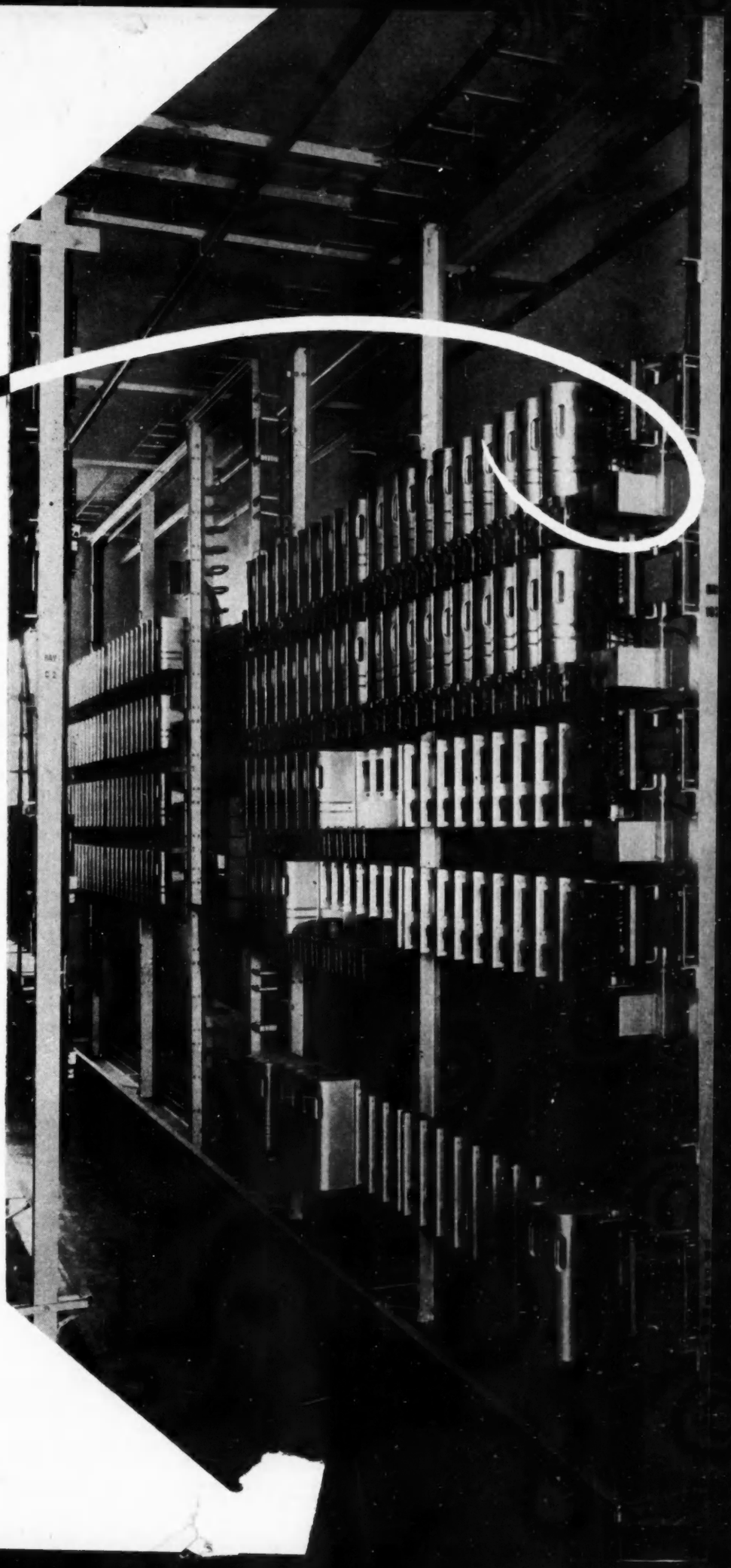


S. A.
TION

Radio Course For Telephone Men

(Continued from page 32)

ponents commonly used in the telephone line, it can not be inserted directly in voice frequency circuits without special auxiliary equipment if it is to give *two-way transmission.*

When we apply an alternating voltage to the grid circuit of an amplifying tube, it produces a fluctuating or varying current in the plate circuit. This fluctuating direct current is converted into alternating current either by the action of a transformer which feeds the next tube or the output circuit, or by means of the coupling condensers and impedances used in the plate circuit, as shown by Fig. 68.

Tetrodes and Pentodes

TUBES having four elements are known as *tetrodes* and five element tubes as *pentodes.* These tubes accomplish the same purpose as triodes and have some special advantages. The triode is a three element tube and offers the disadvantage of having a relatively high inter-electrode capacitance. When used as amplifiers this often results in unwarranted oscillations due to energy from the plate circuit feeding back into the grid circuit. By interposing a *screen grid* between the plate and control grid and connecting this screen grid to a positive potential whose value is somewhat

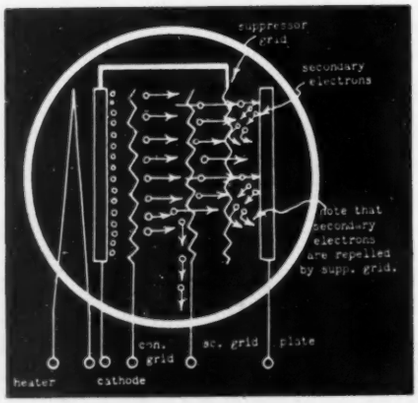


Fig. 70—Action of suppresser grid in pentode tube.

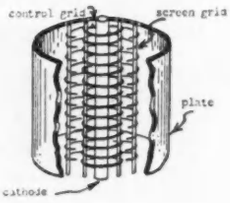


Fig. 69—Arrangement of elements in tetrode tube.

lower than that used on the plate the inter-electrode capacitance between plate and control grid can be greatly reduced. This basic principle of the tetrode tube is illustrated schematically in Fig. 69.

Tetrode tubes are used as radio and audio amplifiers and for many other purposes. They have much higher amplification factors than do ordinary triode tubes.

Pentodes are similar to tetrodes with the exception that they have in addition to the screen grid, a *suppressor grid* which increases the efficiency of the tube by reducing *secondary emission* from the plate. Secondary emission results from the negative electrons colliding with the plate and releasing additional electrons (secondary) which travel back toward the screen grid and thus reduce the efficiency of the tube.

The suppressor grid prevents this reverse movement of electrons as is shown in Fig. 70.

Multi-Element Tubes

IN order to obtain more compact units the vacuum tube manufacturers have made available tubes having as many as seven or eight elements in one glass envelope. No basically new theory is involved, and these tubes consist merely of a single cathode which supplies the various elements that accomplish different functions. A typical tube of this type is shown in Fig. 71 and is known as a *duplex-diode-pentode tube.* This type of tube is used as a detector following a radio frequency stage and also functions as the first stage of audio applications.

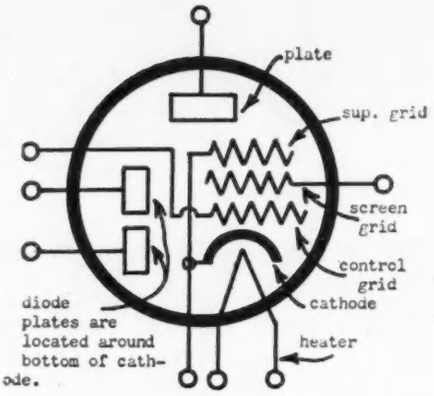


Fig. 71—The duplex-diode-pentode tube.

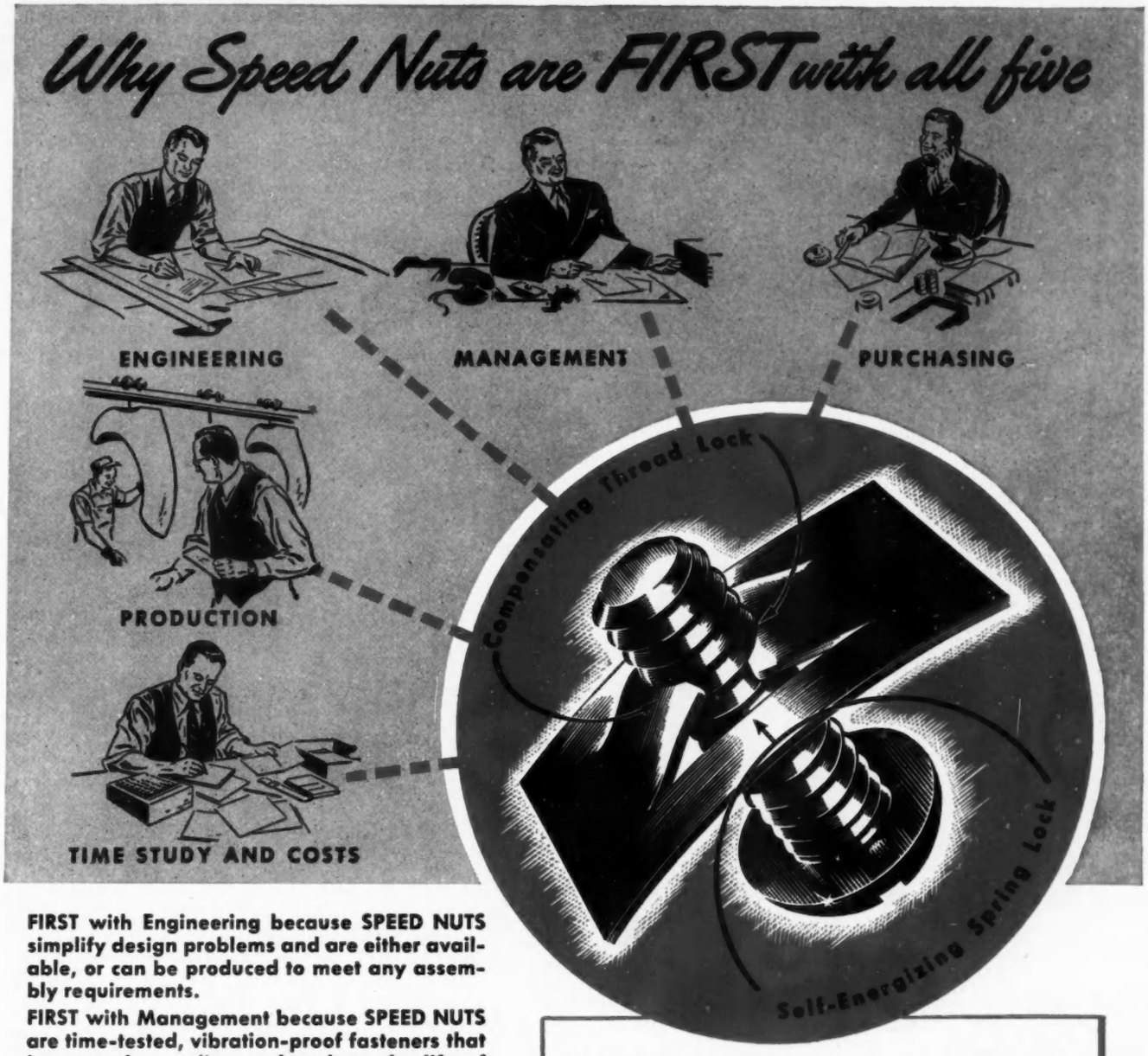
Examination Questions

Chapter 5—Basic Theory of Vacuum Tube Oscillators

1. **What are the two principal types of vacuum tube oscillators? Explain the difference between them.**
2. **Draw a simple schematic circuit of a plate coil-feed back type of vacuum tube oscillator.**
3. **What determines the frequency of a self-excited vacuum tube oscillator?**
4. **Compute the operating frequency of a self-excited tube oscillator having a tuned circuit with an inductance of ten microhenries and a capacitance of 20 micro-farads.**
5. **State some of the disadvantages of the self-excited tube oscillator.**
6. **What are some of the advantages of the master oscillator-power amplifier type of radio transmitter?**
7. **Explain how a quartz crystal is used to control the frequency of a radio transmitter.**
8. **How can a low frequency crystal be used to control a high frequency oscillator?**
9. **Explain briefly the action in a triode tube.**
10. **Why is it often necessary to use a bias voltage on the control grid of a vacuum tube?**

(Part 1 of Chapter 6, will appear in the September 1 FORTNIGHTLY TELEPHONE ENGINEER.)

Why Speed Nuts are FIRST with all five



FIRST with Engineering because SPEED NUTS simplify design problems and are either available, or can be produced to meet any assembly requirements.

FIRST with Management because SPEED NUTS are time-tested, vibration-proof fasteners that improve the quality, and prolong the life of the finished product.

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FIRST with Production because SPEED NUTS eliminate extra handling of production parts, are applied faster and easier, and compensate for a wider range of commercial tolerances.

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Investigation will prove that SPEED NUTS should be YOUR first choice, too. Write for information today.

NOTHING LOCKS LIKE A SPEED NUT

TWO distinct forces are exerted on the screw, as a SPEED NUT is tightened.

First, a compensating thread lock, as the two arched prongs move inward to lock against the root of the screw thread. These free-acting prongs compensate for screw thread tolerance variations.

Second, a self-energizing spring lock, created by the compression of the arch in both the prongs and base. The combined forces of the thread lock and spring lock definitely prevent vibration loosening.

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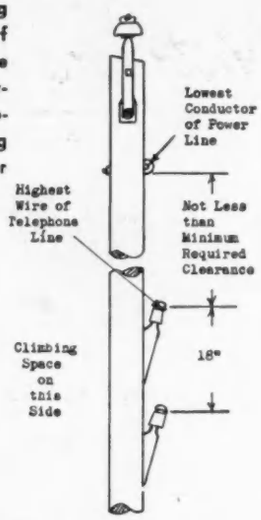
FASTEST THING IN FASTENINGS . . . OVER 3000 SHAPES AND SIZES

Fig. 1—Showing location of brackets on one side of jointly-used pole to provide climbing space for power lineman.


Lowest Conductor of Power Line
Highest Wire of Telephone Line
Not Less than Minimum Required Clearance
18"
Climbing Space on this Side

LINE and DESK

Edited By
J. S. REED, JR.

Q. How should we provide climbing space on a bracket lead used jointly with a power spur to a farm residence? We understand we have to provide at least 30 inches by 30 inches space on a jointly-used pole but how can this be done when a bracket lead is to be on the same pole with the power line?

A. The simplest method of providing the required climbing space for the power lineman is to place the two brackets on one side of the pole as shown in Figure 1. The brackets should be so mounted that the wires are 18 inches apart and the top telephone wire is at least 4 feet below the lowest power wire (for primary leads of less than 8700 volts). Be sure the lowest telephone wire clears the ground by at least the height required for lines in rural areas (15 feet at the side of the road or farm driveway and 18 feet when crossing the road or driveway).

Q. How can we decide when to use porcelain knobs and tubes on drop wire runs on wood frame buildings?

A. Knobs and tubes are always required for drop wire runs terminating in a station protector either in or just outside the building when the latter is of wood frame construction. The protector is necessary when there is a possibility of the telephone lines coming in contact with power wires carrying more than 250 volts between conductors or the line is exposed to lightning. Knobs and tubes are not required on wires running from one station protector to the telephone instrument.

Q. We are interested in good drop wire installation methods and would like to know how a wire run should be routed from the attachment on the building to the station protector. What are the determining factors in this case?

A. The shortest practicable run should be installed and should be vertical; runs in the horizontal direction being avoided if possible. The determining factors are the location of ground for the station protector, the method of entering the building (foundation sill or basement window frame being preferable) and a location on the building that will provide a clear path for the drop from the terminal pole to the building. (The use of a span clamp on the cable messenger will materially aid in routing the wire away from trees or other obstructions.)

Q. What is the maximum number of ampere turns that magnetizer should have in order to satisfactorily recharge any size of permanent magnet used in the telephone field?

A. About 8000 ampere turns will produce a sufficiently powerful magnetizing current for all magnet recharging work.

Q. During certain periods of the year our rural lines are subject to a kind of crackling noise, yet at other times they are relatively quiet. What is the cause of this periodic noise?

A. From the description you give of the line noise, we believe it is due to static discharges across the line wires. When the air is very dry and a wind is blowing, static charges are built up across the wires as the result of electrified particles of sand, dirt, or dry snow striking them. Sufficiently high voltages are developed in this manner to cause periodic discharges across protector air gaps resulting in a crackling or sputtering noise. Ordinarily this noise should not be sufficiently loud to interfere with transmission; but if much trouble is experienced with this effect, the use of drainage coils connected as shown in Figure 2 will prevent static charges from building up and discharging across air gaps.

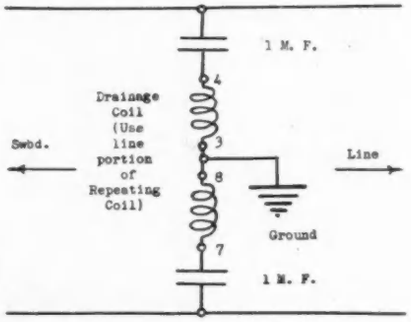
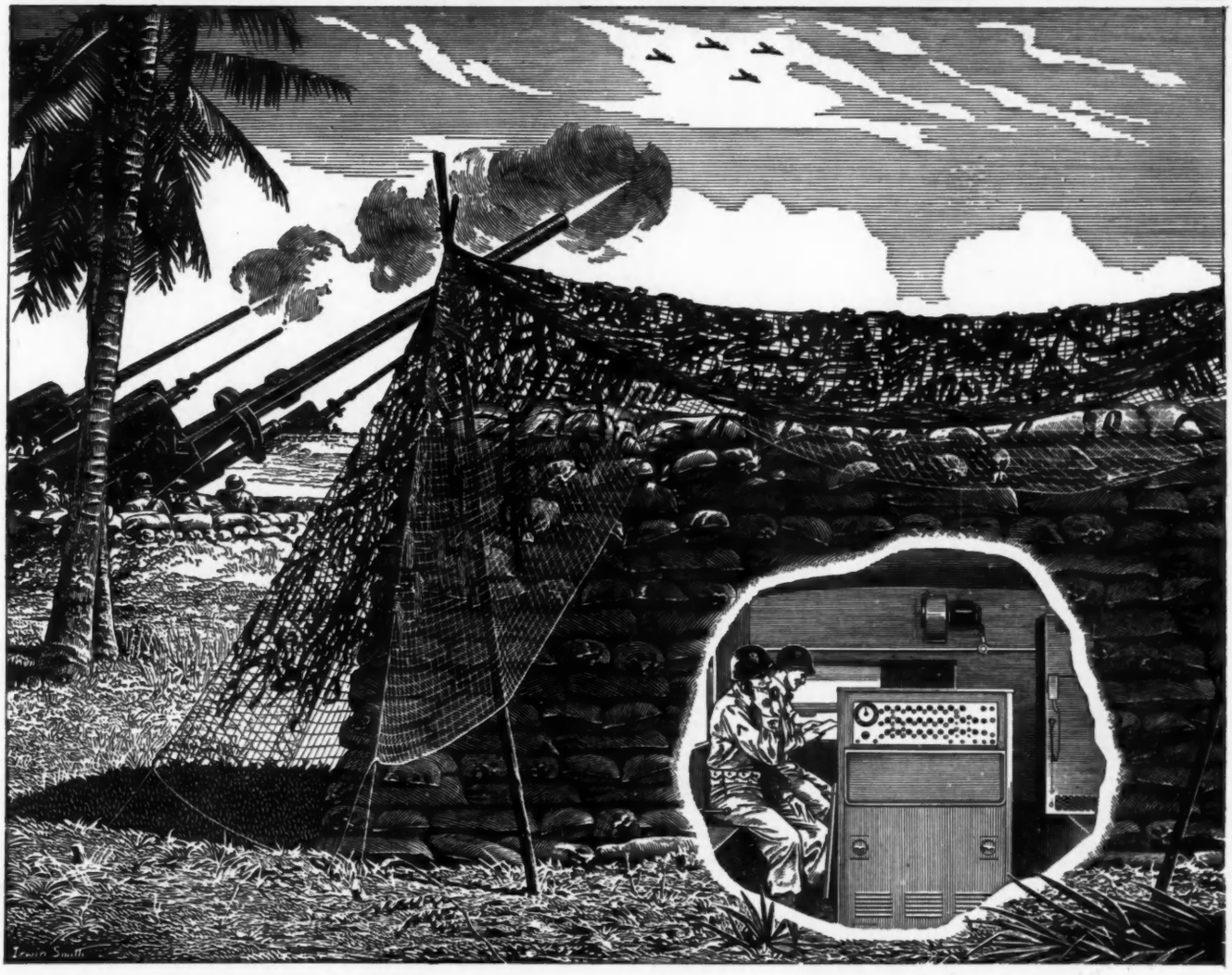


Fig. 2—Use of drainage coils to prevent noise due to static discharges on open wire lines.

Electrical Weapons by the Maker of Bell Telephones

No. 4 of a series: *for the Army Ordnance Department*



The *Electrical* Brain in its sandbag pit

In a trailer, protected by sandbags, an amazing device solves involved mathematical problems with lightning speed. It is an *electronic* gun director which enables anti-aircraft gunners to knock down enemy planes with hitherto unheard of accuracy.

Scientists of Bell Telephone Laboratories, drawing on their years of experience in the development of telephone apparatus and working closely with Army Ordnance experts, evolved this electronic super-brain which adds, subtracts, divides, multiplies, differentiates, integrates, and "consults" ballistic tables—all the while instantly and continuously aiming the guns at the spot calculated to destroy a speeding target!

More than 500 individuals worked on the design—over 5,000 drawings and 1,100 specifications were prepared for its 16,000 parts, which include a great many electrical principles and devices well known in the telephone industry.

Quantity production of this complex device held many problems. But Western Electric's long experience in building complex Bell Telephone apparatus to highest standards of precision, made it possible.

Against both planes and robot bombs, these *electronic* directors have helped AA gunners to hang up new high records of accuracy.

Buy more War Bonds—and keep them!

Western Electric

IN PEACE...SOURCE OF SUPPLY FOR THE BELL SYSTEM.
IN WAR...ARSENAL OF COMMUNICATIONS EQUIPMENT.

ENGINEERING RESEARCH . . .
Thermoplastic insulation specialists . . . producing a complete line from fine wires to heavy power cables . . . serving: Public Utilities, Radio, Electronic, Appliance and Instrument Manufacturers, Telephone Companies and Contractors.

There is no substitute for engineering. Nationally recognized engineering talent . . . PLUS exclusive equipment, careful materials control, and exacting inspection . . . . explain PLASTIC'S amazing achievements in the design and production of thermoplastic insulated wire and cable. This engineering "know how" is at your command . . . . for today's planning or tomorrow's production. Write for complete information and samples engineered to fit your particular requirements. Remember . . . when you're thinking of PLASTIC you're thinking of US!

PLASTIC

WIRE & CABLE *NORWICH CONN*

CORPORATION

13 Independent Executives Invited on OPA Committee

Thirteen executives of Independent telephone companies have been invited by the OPA Public Utilities Division to serve on an Industry Advisory Committee on rate increase matters, but so far the full acceptances have not been received and the committee has not been organized.

Those who have been asked to serve are: R. Z. Achatz, general manager of the Southern Indiana Telephone Co.; F. S. Barnes, president of the Rock Hill, S. C., Telephone Co.; F. E. Bohn, president of the Home Telephone & Telegraph Co. of Fort Wayne, Ind.; president Harold V. Bozell of the General Telephone Corporation; W. B. Clay, manager of the Hutchinson, Minn., Telephone Co.; Francis Crosby, general manager of the Oxnard, Santa Paula and Colusa Telephone Co.'s; Herbert Foster, manager of the Lewiston, Green & Monmouth, Me., Telephone Co.; D. O. Hood, president of the Columbia Utilities Co.; W. B. Lawton, general manager of the Viroqua, Wis., Telephone Co.; George B. Quatman, who supervises a number of Ohio Independents; D. T. Strickland, vice president of the Southwestern States Telephone Co. of Brownwood, Texas; and H. W. Vaughn, president of the Alabama Telephone Co. of Fayette, Ala.

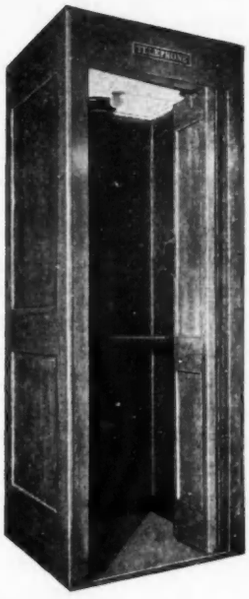
Independent Pioneers Vote No Convention This Year

By unanimous vote of the directors of the Independent Pioneer Telephone Association there will be no convention of that group this Fall. The one day meeting was always scheduled for meeting concurrently with that of the United States Independent Telephone Association which has called off their 1945 meeting.

By-laws of the Pioneers made provision for election of directors during years when no annual meeting is held, according to Garland B. Foscue, Pioner president, therefore a directors' meeting will be called during the Fall to transact association business and vote on directors whose terms are expiring. Three directors' terms expire this year.

President Foscue has also announced that directors had unanimously voted to dispense with the publication of the 1945 Roster as in the past this yearly feature has always been eliminated when an annual meeting was not held. The Roster uses paper which is now rationed so the decision was a patriotic one for war times.

STROMBERG-CARLSON RECOMMENDS...



The

CHURCHILL

TELEPHONE BOOTH with Automatic Electric Ventilator

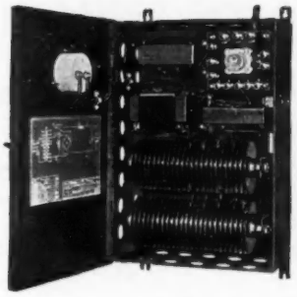
Standard equipment on the CHURCHILL No. 100 Folding Door Telephone Booth is an automatic electric ventilator that keeps fresh air in the booth. An electric light makes reading or writing messages, telephone numbers, etc. easy. With such conveniences for your customers, watch your pay station business climb.

The CHURCHILL Booth is constructed as a single unit and equipped with a reinforced back panel for mounting a wall telephone or coin collector.

Made of selected white oak, available in light or medium oak in a satin finish.

Overall height is 84¾"; width, 29"; depth, 30½". Shipped knocked down and crated.

Illustrated literature available.



ELECTROX AUTOMATIC

BATTERY CHARGER TYPE RB

***Manufactured by* SCHAUER MACHINE CO.**

Keeps Batteries in Peak Condition At All Times.

- Completely Automatic.
- Floats Across the Battery.
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STROMBERG PROGRESS IN TELEPHONY CARLSON

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Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by
ROLAND C. DAVIES
Editor, Telecommunications Reports

War

ATOMIC Bombing with its promise of a new epoch of Atomic Energy and the Japanese surrender naturally transcended completely every other development and made the affairs of the United States Government and the National Capital in a state of dynamic, fast-moving events which at our deadline had not crystallized.

With the Japanese surrender came the overhauling by the Army and Navy of their contracts with the telephone and radio-electronic manufacturing companies. But as of the present it was authoritatively revealed to TELEPHONE ENGINEER both military services DO NOT plan drastic cutbacks, particularly in the radio-electronic fields.

Substantial cancellations of telephone central office, switchboard, instrument and cable contracts would be welcomed by the telephone manufacturing industry, it is generally felt, as its production can be converted immediately into the sorely needed civilian requirements. In regard to radio-electronic military needs it was stated both by Army Air Forces and Signal Corps and by the Navy Electronics Division that the cutbacks would be gradual and there would be a substantial retention of the tube and component contracts for maintenance and repair.

The navy will NOT engage in any radical slashing of contracts except in the case of certain equipment types. But its flow of orders will be kept in large volume because it is desirous of replacing all old-type radio, radar, sonar and electronic equipments in the Fleet with the latest modernized apparatus. In addition, there will be a huge volume of tubes, components and parts needed for maintenance and repair and this phase of its program might even be increased in certain categories.

There will also be NO drastic cutbacks for a number of months of the communications facilities of the Army and Navy in their bases, camps and establishments in the United States, except in training areas, it was authoritatively learned. Telephone requirements will still be badly needed for the redeployment and discharge of the millions in the Army and Navy and most of the existing Army camps and Navy bases will be retained for that purpose, it was believed on the basis of present planning.

Atomic Energy

A POLL of competent scientists and technical experts in the telephone and wire communications and radio fields about the potential effect of the new era of Atomic Energy produced a consensus that little, if any, impact was foreseen. Atomic Energy—when and if it is harnessed and controlled in regulated amounts—will be useful for the furnishing of power and heat and its niche may fall eventually into these latter fields which would mean the telephone companies would use this source for electrical energy.

But those scientists who have been closely associated with the "Manhattan Project" (the development and production of the atomic bombs caution that it will take years of development and effort before the industrial uses can be realized and perfected. At any rate the new field of Atomic Power will remain a government monopoly under the commission, proposed by President Truman to guard against misuses of the destructive potentialities of atomic energy. In this sphere will be the first demonstration of the leadership of the Government in the promotion of scientific research and development as proposed by Director Vannevar Bush in his National Scientific Research Foundation program.

Even though the picture of the prospective "Age of Atomic Energy" presents many pinnacles of imagination for the future world, the telephone industry is likewise planning a postwar renovation of its services. This is exemplified in the two-billion-dollar program of the Bell System for construction of new facilities to take care of the pent-up demand for telephone subscribers, extension of its coaxial cable network, toll dialing, radio relay systems and new radiotelephone mobile services for buses, trucks, taxis, physicians, delivery trucks, etc.

FCC

EXCEPT for its interest in the participation of the telephone industry in the postwar urban and highway mobile radiotelephone service, the FCC has been concentrating its efforts in recent weeks on broadcasting, particularly new broadcast services of FM and television. Therefore, the telephone industry has found things pretty quiet for the time being at the Federal Commission.

FCC Policy on Mobile Radiotelephone Service

THE FCC is slated to issue a statement of policy in regard to experimental radiocommunications operations in the urban and highway fields in the near future, it was indicated authoritatively at the Commission. After experimentation in these mobile radiotelephone fields has been conducted, it will undoubtedly be necessary to hold hearings.

Due to VICTORY OVER JAPAN and the resultant celebration in every plant and home in the country, TELEPHONE ENGINEER is late in reaching its readers, but there was never better reason for a time of rejoicing.

•

We also wish to announce with deep and sincere regret the death on August 11 of our printer, Arch R. Johnson, 54, who had been suffering from leukemia for a long time but who kept on all these years of war. Arch Johnson was a faithful, wonderful friend and cooperated in every way possible to do a splendid job for TELEPHONE ENGINEER.

Two developments of organization of separate agencies than the telephone companies to administer and operate mobile radiotelephone service followed the recent decision by the FCC in its grant of the Southwestern Bell Telephone Co.'s experimental urban mobile service with the limitation against commercial usage before the Commission had determined its policy of operation.

The passenger motorbus companies are planning to organize into an agency projected to operate later a nationwide radiocommunications system. This is being called Intercity Bus Radio and in charge of the planning and discussions with the FCC and other government agencies is Frank Walker, formerly of the Michigan State police radio organization. It is planned to test the service in the Chicago area.

An organization of freight motor carriers, called Highway Radio, Inc., has also been formed and has filed an application with the FCC for permission to equip 100 Chicago trucks with mobile transmitters and receivers for FM radiotelephone service. Highway Radio expects to prove through its radiotelephone tests that the efficiency of freight handling by trucks can be vastly improved both in savings of about 10 miles daily, dispatching or holding departing trucks, and safety aids in storms and accidents.

Until the FCC makes a determination on the policies for the operations of the urban and highway mobile service, the question of charges for this mobile radiotelephone service by the telephone companies cannot be settled, it was intimated by FCC staff sources. The discussion of charges was the subject of a recent conference between AT&T representatives and the FCC staff following the Southwestern Bell decision, which was incidentally the first authorization of this type of urban mobile radio service.

OPA Advisory Committee

THE OPA Public Utilities Division is looking for one or two non-USITA members of under 1,000 stations to serve on its Industry Rate Advisory Committee, an OPA spokesman disclosed to TELEPHONE ENGINEER. This would swell committee membership to 14 or 15, the present roster listing invitations to 13 executives of Independent telephone companies. OF COURSE WITH THE JAPANESE SURRENDER THE COMMITTEE MAY NEVER COME INTO BEING AS THE BAN AGAINST RATE INCREASES DURING THE WAR WILL HAVE BEEN OBVIATED.

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POLES
Bearing this
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"The Stamp of Character"
Product of

T. J. MOSS
TIE COMPANY

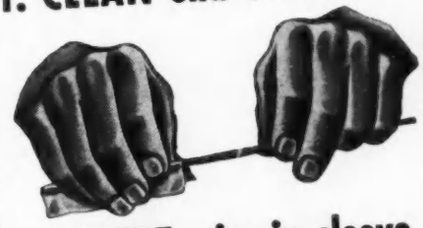
Poles bearing this trade-mark are your guarantee of the highest quality creosoted southern yellow pine poles.

Every pole bearing this mark is completely supervised from tree to consumer by men experienced in the industry.

Nicopress

SPLICING SLEEVES FOR MAKING FASTER LINE SPLICES

1. CLEAN end of wire



2. INSERT wire in sleeve

3. COMPRESS with *Nicopress* Tool

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ISN'T IT!

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RELIABLE 955A

INDIVIDUAL STATION PROTECTOR

Mfd. by
Reliable Electric Company

- **One-piece Design**
- **Simplified Mounting**
- **Asbestos Mats Eliminated**

The very simplicity of the Reliable 955A is assurance of long, trouble-free service. Fuses are mounted on a one-piece, low absorption porcelain well spaced for convenient connecting. Reliable Self-cleaning Sawtooth Discharge Blocks are standard, dissipating static without time lag or danger of grounding the line. The 955A uses No. 77 seven ampere fuses —other fuse capacities can be furnished.

"Reliable Identifies the Quality"

"Eveready" "Columbia" "Gray Label"

The quality cell preferred by telephone engineers

Long Life Telephone DRY CELLS

- **Higher sustained voltage.**
- **Longer life.**
- **Rock-bottom economy.**

These qualities, more important now than ever before, are assured through the constant supervision of America's largest dry battery laboratory.
Made by the makers of "Eveready" "Air Cell" Operators' Transmitter Batteries.

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OPA does not want the committee to favor the larger telephone companies, the spokesman said. A factor which stands in the way of non-association small company membership is, however, the expense of participation. Because of the travel situation, the Committee will probably not meet until early October, and the session would be in Chicago. This would be desirable because of Chicago's central location in relation to the Independent industry.

Of the officials of Independent companies **invited by the OPA** to participate on the committee only a few acceptances had been received. Those invited by the OPA to serve were: R. Z. Achatz, general manager of the Southern Indiana Telephone Co.; F. S. Barnes, president of the Rock Hill, S. C. Telephone Co.; F. E. Bohn, president of the Home Telephone & Telegraph Co. of Fort Wayne, Ind.; President Harold V. Bozell, of the General Telephone Corporation; W. B. Clay, manager of the Hutchinson, Minn., Telephone Co.; Francis Crosby, general manager of the Oxnard, Santa Paula and Colusa Telephone Co.'s; Herbert Foster, manager of the Lewiston, Green & Monmouth, Me., Telephone Co.; D. C. Hood, president of the Columbia Utilities Co.; W. B. Lawton, general manager of the Viroqua, Wis. Telephone Co.; George B. Quatman, who supervises a number of Ohio Independents; D. T. Strickland, vice president of the Southwestern States Telephone Co. of Brownwood, Texas; and H. W. Vaughn, president of the Alabama Telephone Co. of Fayette, Ala.

U.S.-Hawaii Phone Rates

FCC Commissioner Paul A. Walker and Chief Accountant William J. Norfleet are now in Hawaii engaging in a study and negotiations with the AT&T and Mutual Telephone Co. of Hawaii on the telephone rates between the Hawaiian Islands and the United States mainland. They were accompanied by assistant vice president William G. Thompson of the AT&T Long Lines Department in charge of overseas telephone service. The two FCC officials also conferred with the Hawaiian utilities commission.

Signal Corps Settlement Agency

IN order to pave the way for speedy contract termination, the Signal Corps since last fall has trained hundreds of officers and enlisted men in contract settlements procedures and has given manufacturers previews of the contract settlements procedures as well as forecasts of cutbacks. In

fact, the Signal Corps Procurement and Distribution Service under the leadership of Major General William H. Harrison has been the pioneer in the Army in this field of preparedness for contract terminations.

So as to implement this work still more effectively, the Signal Corps has just consolidated its contract termination branches of the Philadelphia Procurement District and the Monmouth Procurement District at Bradley Beach, N. J., into a single organization to be known as the Signal Corps Contract Settlement Agency to be located at Philadelphia. The new agency, which will start operation early in September, will be under the command of Colonel Van Ness Philip.

WPB Advisory Meeting

A MEETING of the Telephone Operations Industry Advisory Committee of the WPB Communications Division has been scheduled for September 27, Division Director Leighton H. Peebles announced this week to discuss the timing of any future withdrawal of the preference schedules of essential telephone users in Limitation Order U-2. The viewpoint of the industry on this question will be sought in order to counsel the WPB top officialdom on the termination of this remaining portion of the U-2 order.

Until civilian production of central office equipment and telephone instruments gets effectively under full swing and affords an adequate supply of facilities to take care of the backed-up demand for telephone service, the industry has felt these preference schedules should be retained.

Some "silver linings" of equipment for civilian usage have appeared on the horizon, but so far not in sufficient form for a solution of the situation. There are several large cancellations of military equipment orders from the armed forces in sight. As another betterment of the situation, the Army and Navy have agreed to declare as surplus as much communications cable as is possible. The advance indications of this surplus portend small but important quantities of cable may soon become available.

An obstacle in progress of both civilian and military production has occurred in this week's withdrawal of draft deferments by the Army and Navy of highly skilled employees below 30 years of age in the communications manufacturing industry. The industry has already supplied a great many technicians and engineers for the armed forces and officials in non-military government agencies feel that this step may slow up military deliveries

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GENUINE
IRONITE
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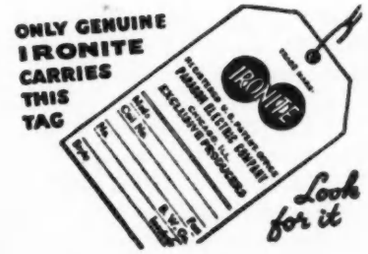
A recognized leader for forty years, because of its strength . . . long-life . . . conductivity, and easy workability.



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"Whitall Tatum"
GLASS INSULATORS

MFD. BY THE
ARMSTRONG CORK COMPANY

Withstand All Weather Conditions

Armstrong's Glass Insulators withstand all weather conditions. In torrid heat . . . in extreme cold . . . in deluge . . . in blizzard, these rugged insulators have proved they can "take it."

107 years of glass-making experience are back of Armstrong's "Whitall Tatum" Glass Insulators. Raw materials are rigidly tested . . . quality of glass is regularly checked . . . each stage of production is automatically controlled. Tests show that transverse strength exceeds that of supporting pins. Other characteristics of Armstrong's Glass Insulators are:

Accurate dimensions.
True pin fit.
Crystal clarity.

Conform to—or exceed A.S.T.M. standards

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and at the same time cause a large retardation of civilian production.

As an example, the Army and Navy, according to reports, have been demanding that Western Electric release to the armed services a substantial percentage of highly skilled workers who had been deferred. Numerically, it is a small group but the effect on production is said to be tremendous.

In order to expand its military and particularly civilian production, Western Electric is now subcontracting or purchasing parts, materials and finished products from several thousand subcontractors.

Lumpkin to Europe

PRESIDENT R. A. Lumpkin of Illinois Consolidated Telephone Company is leaving for Europe probably on August 24 to become European representative for the government's survey of German industry which is being conducted by the Army and Navy, WPB and other civilian agencies of the government. He succeeds Dr. Roy F. Glasgow, who had been serving since last March as the European representative on leave from a directorship of the electrical engineering department of Washington University and St. Louis.

Leighton H. Peebles, director of WPB Communications Division, is chairman of the Communications Committee of TIIC. As executive secretary for this committee, G. D. Edwards of Bell Telephone Laboratories has been largely responsible for the planning of the work from the American end and for the selection of the investigators and other personnel.

Among the leading experts who have been investigating and who are preparing to go to Germany within the next few days are: R. W. Augustine, apparatus engineering department of Kellogg Switchboard & Supply Co.; Frederick E. Henderson, superintendent of manufacturing engineering, Pt. Breeze, Maryland, Western Electric Co.; R. H. McCarthy, superintendent of manufacturing engineering, Kearney Works, Western Electric; and Dr. Pierce Mertz, Bell Telephone Laboratories.

WAR PRODUCTION BOARD
OFFICE OF WAR UTILITIES
WASHINGTON 25, D.C.
July 23, 1945

ADMINISTRATIVE LETTER

TO: All Utilities

SUBJECT: Revised Priorities System

This letter is to call your attention to Priorities Regulation 29 issued by the War Production Board on June 30, 1945. This regulation describes the transition from the present priorities system of AA preference ratings and allotment symbols to one consisting of only two preference ratings; one, the present AAA rating and two, an MM rating reserved for military procurement.

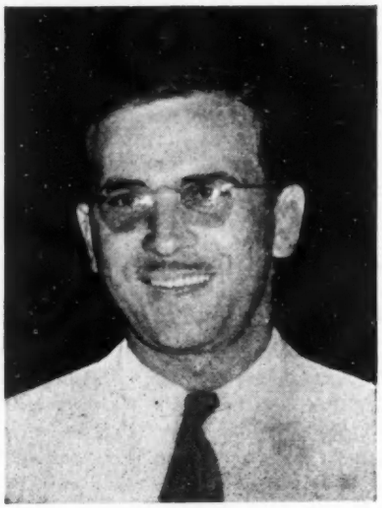
On January 1, 1946 the preference ratings and allotment symbols assigned by utility orders for maintenance, repair and operating supplies and those specifically assigned for major construction on Form WPB-2774 will become invalid along with all other AA preference ratings and allotments issued by the War Production Board. Up to that time the AA rating system will remain in effect but only in so far as deliveries to be made in 1945 are concerned. After October 1 all outstanding AA ratings become invalid on orders calling for delivery in 1946; however, up to that time, such ratings may be used to obtain a place on 1946 delivery schedules for products which require long production cycles.

Under the recent amendments of the Utility orders it has been possible for utilities to undertake expansions of facilities, except for the construction of buildings, without specific authority from the Office of War Utilities. Some difficulties are being encountered however in obtaining material and equipment to carry out much of this desirable construction without preference rating and allotment assistance. The steps announced in Priorities Regulation 29 will soon abolish the advantage of preference ratings and allotment symbols particularly on longer lead time items and will thus permit utilities to profit more fully from the relaxations in the controls of construction which OWU adopted in the early part of June.

Edward Falck
Director
Office of War Utilities

USITA Director Leland Wright

Leland Wright, 39, a director of the United States Independent Telephone Association and manager of the Alexandria (Minn.) Telephone Co., succumbed to a lingering illness at the Alexandria hospital July 28.



Leland Wright

Mr. Wright was one of the promising younger executives of the telephone industry. Until his illness caused him to cease his more active participation in national telephone affairs he was honored many times for his services. He served his native Minnesota for many years, two of them as president of the Minnesota Telephone Association. He also served as a member of the executive committee of that group most of his business life.

As a director of USITA Mr. Wright was a member of several committees. He travelled throughout the country during the 1930's and appeared on many state telephone convention programs furthering committee projects. His views and suggestions on public relations and advertising were adopted in many sections.

Leland, or "Nubs" to his friends, followed his father as manager of the Alexandria company, succeeding him just as he was entering the University of Minnesota for his senior year.

Automobile Accident Fatal To Mrs. Earl F. Stice

Earl F. Stice, of the National Trail Telephone Company, Altamont, Ill., was seriously injured in an automobile accident at Mattoon, Ill., August 5, and Mrs. Stice killed instantly according to newspaper reports.

Mr. Stice is in the hospital suffering from bad bruises, a broken arm and internal injuries. He is well known in the Independent telephone industry as a director and past president of the Illinois Telephone Association.

Colby H. Knapp Named By Stromberg-Carlson

Colby H. Knapp

Lloyd L. Spencer, vice-president in charge of sales of the Stromberg-Carlson Company, announced recently that Colby H. Knapp has been appointed supply sales manager for the company's telephone division.

In his new capacity, Mr. Knapp will be responsible for the sale of supplies and construction material which the company distributes to the telephone trade. He will continue to make his headquarters at the company's Chicago branch office located at 564 West Adams Street.

Mr. Knapp has been a popular figure in the telephone industry for many years. He joined the Stromberg-Carlson Company in September, 1927, following his graduation from the University of Illinois. A native of Lincoln, Ill., he received his earlier education at that city's Community High School.

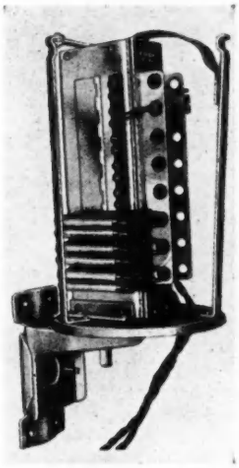
His entire business career has been spent with the Rochester, N. Y. company, having served as assistant Chicago supply manager, Chicago supply manager, radio and telephone representative in the states of Illinois and Iowa, telephone sales representative in Indiana and Wisconsin, Chicago office manager and cashier. During the war period, Mr. Knapp was a member of the priorities department at the main office in Rochester, New York.

Mr. Knapp is married and resides at 650 Hinman Avenue, Evanston, Illinois. He is a member of the Phi Kappa Sigma fraternity.

STROMBERG-CARLSON Recommends...

The COOK S-20 POLE CABLE TERMINAL and PROTECTOR MOUNTING for

- CONVENIENCE
- ACCESSIBILITY
- ECONOMY



The S-20 is expertly engineered and rigidly constructed to give maximum satisfaction.

Protector units are installed only as needed.

The pole bracket reduces installation labor.

Drop connections, fuses, and lightning dischargers are at the front and are easily accessible.

DIAMOND C

Creosoted Yellow Pine

POLES

Mfd. by Colfax Lumber & Creosoting Company, Inc.

COLFAX Creosoted Yellow Pine Poles are carefully graded according to physical properties desired and treated with 8 lbs., or more if you wish, of Grade No. 1 Creosote Oil in accordance with AWPA specifications.

Each pole is treated full length under pressure with the finest and cleanest creosote oil obtainable.

Reduce losses in revenue due to pole failures—specify:

DIAMOND C

Creosoted Yellow Pine Poles

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Current Inter-Company Settlement Problems

(Continued from page 27)

costs have been decreasing and revenues increasing, even in spite of rate reductions (a), terminal costs have increased steadily, reflecting substantial increases in operators' wages, which in some cases are up as much as 50% since the last revision in the connecting company contracts in January, 1943. If the schedules in the illustration were adjusted to compensate for the above rate losses and to meet these latest expenses, it is obvious that the surplus left over for prorate would be decreased even more precipitously.

The effect of the above combination of circumstances on the average Independent line-haul carrier can be devastating. Operating primarily short feeder circuits, these carriers have had no opportunity to utilize the low-cost techniques that have developed in connection with long haul volume traffic. Actually, it is more likely that the costs of these carriers have increased, rather than decreased, over the years. What these various changes mean in the way of dollars and cents to an Independent line carrier is illustrated in Example II which shows a reduction of 57% in the amount available for prorate in the case of a 1000 mile call—from 3.5 mills per message mile in 1935 to 1.5 mills in 1945. In other words if the rate in effect in 1935 was approximately sufficient to cover costs as of that date, and costs have remained unchanged, then an Independent carrier which hauls such a call for 20 miles at today's rates would receive only three cents for rendering a service which costs seven cents to perform. The paradoxical part of this picture is that while the Independent carrier may thus be losing money, the Bell System is able, by handling millions of calls at a high load factor over low cost transcontinental circuit groups, to make such large profits that it is forced to reduce rates still further.

(a) Gross revenues of the Long Line Department of the A.T.&T. Company increased from 90 millions of dollars in 1939 to 199 million in 1944, after rate reductions totalling approximately 100 million dollars annually.

EXAMPLE I

ILLUSTRATION SHOWING EFFECT OF LONG DISTANCE TOLL RATE REDUCTIONS ON REVENUES OF INDEPENDENT CONNECTING COMPANY

CONDITION A

Messages Originated—	Revenue	
800 With A. R. P. M. of $0.30	$240	
200 With A. R. P. M. of 2.00	400	
1000 With A. R. P. M. of $0.64	$640	
Approximate Terminal Compensation @ $0.32	$320	$320
Balance to Prorate-Outward Messages	$320	
Assume Equal Inward Traffic	320	
Total Proratable Revenue	$640	
Assume 10% to Independent Connecting Company		$ 64
Total to Connecting Company		$384

CONDITION B (Assuming Rate Reduction on Long Haul Messages of 40%)

Messages Originated As Above	Revenue	
800 With A. R. P. M. of $0.30	$240	
200 With A. R. P. M. of 1.20	240	
1000 With A. R. P. M. of 0.48	$480	
Approximate Terminal Compensation @ $0.29	$290	$290
Balance to Prorate-Outward Messages	$190	
Assume Equal Inward Traffic	190	
Total Proratable Revenue	$380	
10% to Independent Connecting Company as Above		$ 38
Total to Connecting Company		$328
Reduction From "A"		$ 56
Reduction—Per Cent		14.6%

The inequity of conditions such as those pointed out above leads one to question whether the existing settlement schedules and prorate procedures may have outlived their usefulness, and whether a more satisfactory basis of settlement might be developed along the lines of the new Bell arrangement referred to earlier. Obviously, it requires no stretch of imagination to visualize the "squeeze" that must occur if further rate decreases, coupled with increased terminal costs, theoretically necessitate "A" and "B" schedules exceeding 100% of originating revenue! (It is understood that in the case of a few companies having very low average message revenues, this circumstance already exists.) As a corollary, when terminal payments approach 100%, the amount remaining for line-haul necessarily declines to zero, at which point the entire settlement process disintegrates and fails of its function.

BY contrast, the newly adopted intra-Bell organization settlements properly consider all joint toll business within the Bell system as a huge common operation, in which all the participants share on an equal footing, regardless of size, location or type of service contributed. Under such an arrangement, no one carrier can be earning an excessive return on its part of the joint business while another partner fails to meet its costs. Expenses of all the partners are met **first** out of total joint revenues, then each partner **shares** the balance in proportion to the investment supplied.

An apparent stumbling block in applying this obviously sensible procedure

The chief is no different from the thousands of men all over the globe who never met electricity until the demands of war brought Laytex-insulated Wire to their backyards.

These new friends of Laytex see this wire perform in freezing weather, in moist jungle heat,—and under the shock and impact of battle. No wire was ever meant to withstand such tough wear, yet Laytex comes through again and again.

Laytex Wires and Cables are at present supplying only military needs. One day Laytex will again be ready to fill a long list of civilian needs...Buildings, Police and Fire Alarms, Communications, Signalling, Power, Control, and many more.

Rubber Insulation at Its Best

U.S. Laytex

Reg. U. S. Trade Mark

ELECTRICAL WIRES AND CABLES

Serving Through Science

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

EXAMPLE II

ILLUSTRATION SHOWING EFFECT OF LONG DISTANCE TOLL RATE REDUCTIONS ON PRORATE REVENUES OF INDEPENDENT TOLL CARRIERS

CONDITION A

Assume 1935 initial station to station rate of $3.75 for a 1000 mile message was sufficient to meet terminal payments as per 1935 schedules and leave a balance adequate to cover linehaul costs as of that date:

1935 Total Gross Rate	$3.75
Less Terminal Compensation	0.24
Net for Line-Haul	$3.51
Net Per Mile	3.5 Mills

CONDITION B

As of July 1, 1945, the Initial Rate and Terminal Payments for a similar call were:

1945 Total Gross Rate	$2.00
Less Terminal Compensation	0.50
Net for Line-Haul	$1.50
Net Per Mile	1.5 Mills
Reduction from A	57%

to joint Independent-Bell operations is the practical difficulty of making separate cost studies and separate settlements with 6000 separate Independent connecting carriers. This same difficulty led in the first instance to the development of the existing empirical schedules which at least have the advantage of reducing a very complicated subject to a reasonably simple common denominator. However, there comes a time when simplicity by itself, can no longer be accepted as an excuse for serious inequities, and that time, presumably, is close at hand for the toll compensation and division arrangements now in use.

Looking at the above considerations in brief review, it is apparent that a primary difficulty in connection with the existing arrangements stems from the fact that original toll tariffs failed to make provision for minimum terminal costs, which costs subsequently proved to be very large in relation to the charge for a short haul message. Thus where the average revenue per message is low, even the toll gross receipts may not be adequate to meet terminal expenses, and since the compensation, under existing contracts, is limited to a percentage of total gross, the cost of the terminal function obviously would not be covered. A second difficulty arises from the fact that the short haul feeder traffic is noncompensatory at unit mileage rates which may be very profitable in the case of long haul volume traffic (after deduction in each case for terminal expenses). Stated in another way, more familiar perhaps to the electric utility industry, we see that toll costs which have for years been related to mileage may be more importantly related to load factor and volume. With over-all rates geared to the high earning power of the dominant long haul volume carrier, the resulting tariffs automatically become inadequate to meet the costs of the secondary short haul feeder carriers. Furthermore, these two factors, taken in combination, accentuate each other, since it is in the case of the short haul that terminal costs are proportionally high, thus reducing the balance available for the line carrier to even less than average.

Unfortunately the difficulties outlined above, like many others which face industry at this juncture cannot be solved as simply as they can be stated. While the precedent of the new Bell principle and procedures may be helpful, it seems obvious that much thought will be required and much ingenuity will need to be exercised before these principles can be applied in a practical way to Bell-Independent operations. However, perhaps the foregoing review of the problem, with the challenge that it implies, will stimulate such thought and ingenuity, and the writer invites all interested parties to pass along their ideas and suggestions, in the hope that out of such suggestions, there may be developed an equitable answer by way of particularization of formulae for the many Inddependent companies which are not now recovering their costs and a reasonable profit in addition to cost.

Nebraska Telephone Pioneers Elect New Officers

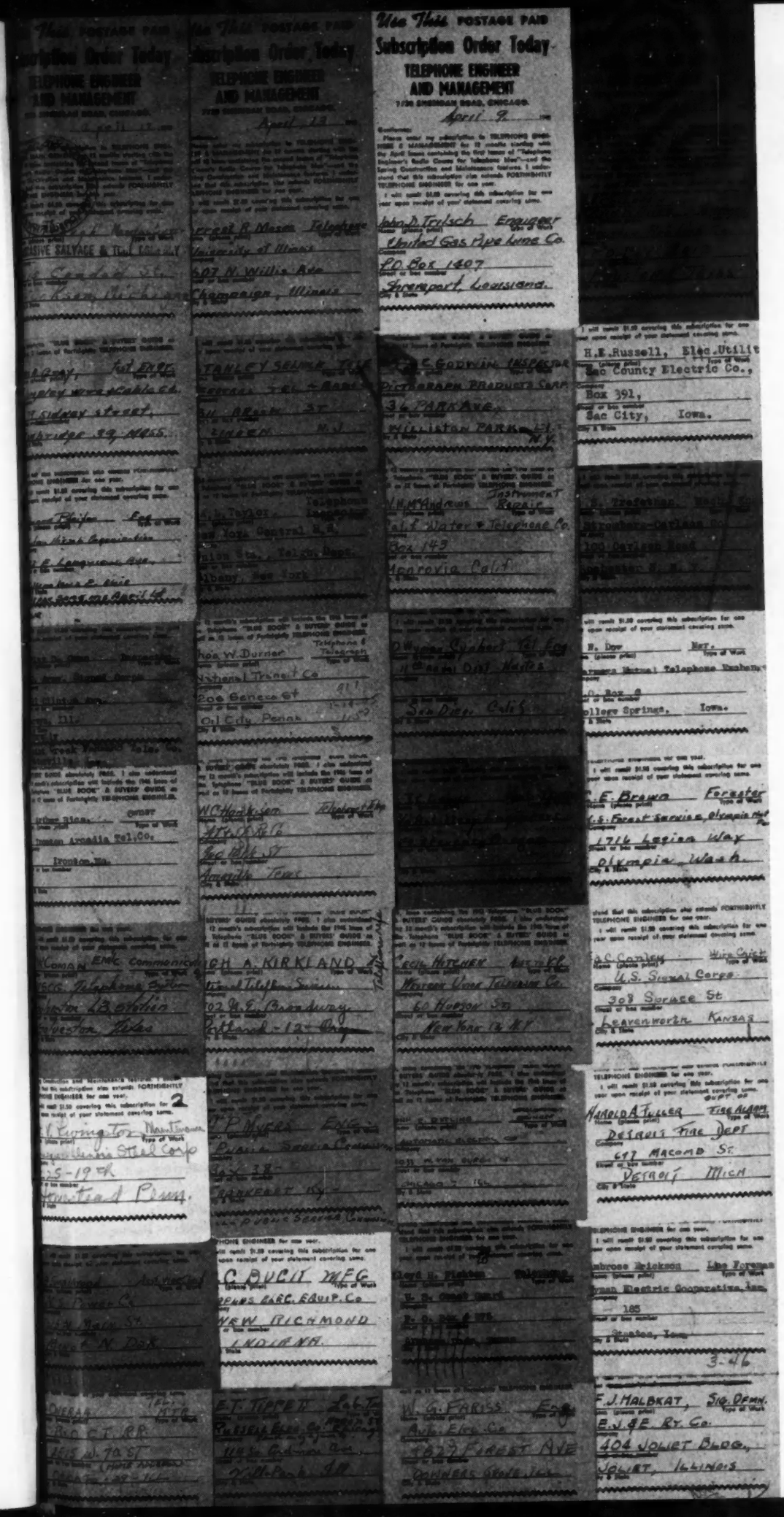
The Frank H. Woods chapter of the Independent Pioneer Telephone Association has held its annual, statewide election of officers by mail and selected J. H. Hartley as president; Jay Pugsley, vice president; Lula Kloepper, secretary, and O. L. Sturtevant, treasurer. All are employees of The Lincoln Telephone and Telegraph Company at Lincoln.

In the same election H. W. Wheeler of Lincoln and R. M. Cleveland of Lincoln were elected as members of the board of directors for three year terms. Other members of this board holding unexpired terms are John Spady, Hastings; Elsie Anderson, Lincoln; Vern Campbell, David City; and Myrtle Hiner, Lincoln.

J. H. Hartley

Merle M. Hale and Mina Jorgensen, both of Lincoln, retired as president and secretary respectively. Mr. Hartley served last year as vice president of the organization, and Mr. Sturtevant was re-elected as treasurer.

The Frank H. Woods chapter, which is a state-wide organization of Independent telephone employees, or workers in associated industries, with fifteen or more years of service, was formed on June 21, 1941, at the home of Mr. Woods in Lincoln. The association has enjoyed a substantial increase in new members during the past year and the membership at present is 343. The new officers look forward to a year of continued growth and activity in association affairs.



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The Harry C. Ingles Wire Span Across the Rhine

AN important link in the telephone communication system of our forces in Germany was constructed in the final days of the European war when a 1600-foot open wire span, one of the longest in the world, was strung across the Rhine by the 36th Signal Heavy Construction Battalion. The span, named by the men who built it, the Harry C. Ingles Span, in honor of the Chief Signal Officer, crosses the river from Urmitz to Engers and is a part of the Cologne-Frankfurt double-arm lead. This difficult task was completed in eleven days, between April 15 and April 26, 1945.

When the speedy establishment of permanent communications across the Rhine was assigned to the 36th Signal Heavy Construction Battalion, the first and perhaps the toughest problem faced was to find material for a span of such size. Improvisation and a number of ingenious substitutions, saved the day. A German steel wire of heavy weight was used, and uncut timber suitable for poles was found in a local sawmill. It was necessary to erect three 65-foot poles on the west bank and three 70-foot poles on the east bank. Channel iron suitable for crossarms was found, cut into proper lengths and drilled. Dead end and suspension fixtures were devised from power insulators and clamps which were secured from a German street car line.

The Ingles Span was the first job of its kind attempted by this battalion, but so careful was the organization and preparation that the work went forward with speed and precision, and there were no foul-ups. Eighty men were engaged in the work and the first two days were spent largely in placing the three dead end poles and three suspension poles on each bank of the river. For dead ending, 30-foot poles were set 150 feet behind the suspension fixture on the west bank, and 172 feet back on more irregular terrain of the east bank. Thus, the distance from dead end to dead end was 1,922 feet.

The most hazardous and difficult step in construction was pulling the wire across the river. First an attempt was made with a barrage balloon cable used as a fish line. Line construction truck power take-offs were set up on opposite banks to wind the line, but it was found impossible to synchronize the reels and the cable snapped. Then four assault boats were lashed together, and with outboard motors these proved powerful enough to pull one strand of wire at a time against the strong current.

Six days after the work began the top ten wires were across. Then rain and high wind made the river unsafe for one day, but after the storm subsided, things went ahead rapidly. The top arm was sagged and dead ended, and the second arm was completed. The wires were given a 30-foot sag, bringing them about eight yards above the mean level of the river. A spacing of 30 inches between wires was made to prevent swinging shorts and to reduce induction, since no transpositions were possible in the span.

As a safety measure a third wooden arm was attached to each suspension fixture so that no wire could fall from its clamp into the river, and a length of strand was run from the ends of the top arm to this third arm. Thus, the wires were completely inclosed. Final tests were made, and the wires bridged through on April 26, eleven days fom the beginning of the work.

It is notable that in constructing the Harry C. Ingles Span safety was given equal priority with speed. As a result there were no accidents. The battalion medics had not even a minor casualty to handle.

Buchanan Research Laboratories Formed

Stephen N. Buchanan, nationally known as an inventor and designer of numerous electrical wiring devices now being manufactured and sold, and the founder of Buchanan Research Laboratory, formerly of Newark, N. J., has been instrumental in the organization of Buchanan Research Laboratories, Inc., with offices at 2 West Jersey Street, Elizabeth, N. J. All of the business of the former Laboratory has been taken over by the new corporation as well as a number of other related activities. Mr. Buchanan is president and heads the new corporation's research and development projects in the field of radio, telephone, television, aircraft and general commercial wiring uses.

S. N. Buchanan

Other principal officers of the new corporation are: Chairman of the Board, Clarence R. Sandford, President of The Elizabethport Banking Company; Executive Vice President, Frank C. Sterck, associated with Mr. Buchanan since 1941.

In addition to the officers, other directors are: Charles Stoeltzlen, President of Penn-Union Electric Corporation of Erie, Pa.; Horace Heyman, President of Heyman Manufacturing Corporation of Kenilworth, N. J., and John W. Anderson, President of Plastic Molding Corp., Sandy Hook, Conn.

Made Health Director

Dr. Leverett D. Bristol, 65 years old, of Montclair, N. J., for fifteen years health director for the American Telephone and Telegraph Company, was nominated to be Maine's health and welfare commissioner July 25 by Governor Hildreth.

"The Amazing Electron"

The Electronic Corporation of America, in peacetime makers of a complete line of home radios, has announced the publication of a booklet, "The Amazing Electron," for distribution to the general public.

Profusely illustrated in cartoon technique, and simply written, the booklet is intended to bring within the grasp of everyone the basic facts about electronics.

According to Samuel J. Novick, president of ECA, "We are entering an electronic age, and every industry, indeed our whole economic and social life will be changed for the better. But unless the general public is kept aware of this expanding frontier of science and industry, business will not reap the full benefits that are possible."

Copies of the booklet can be obtained free by writing to the editor of TELEPHONE ENGINEER AND MANAGEMENT, 7720 Sheridan Road, Chicago 26.

John R. Ruddick Passes

John R. Ruddick, 65, until July 1 secretary treasurer of the Indiana Bell Telephone Company, died at his home in Indianapolis, July 13. At the time of his death, just 13 days after his retirement, he was national treasurer of the American Legion and very active in civic affairs.

Copperweld Appoints Billica Pacific District Manager

Harry J. Billica has been appointed Pacific district manager of the Glassport, Pa., division of the Copperweld Steel Company, according to an announcement made by Mr. W. W. Ege, general manager of sales. Mr. Billica will make his headquarters in the Rialto Building, San Francisco.

Harry J. Billica

At the start of his business career he spent two years with the Ontario Power Company at Niagara Falls, Ontario. After that he was connected for 14 years with the Washington Water Power Company at Spokane, Wash., where he served in various capacities, including operating and construction engineer.

Next he became associated with the Graybar Electric Company as Pacific district manager of the Line Material Department in San Francisco. From 1934 to 1940 he was connected with the Indiana Steel and Wire Company as sales engineer. Just prior to Pearl Harbor he went to Washington as senior priority advisor in the Power Division and Office of War Utilities of the War Production Board. In 1943 he resigned to become affiliated with the Copperweld Steel Company here.

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THREE-POINT TREE PAINT — This Bartlett tree-paint has three highly desirable features: (1) Made with a pure Egyptian asphalt base, it contains only ingredients which aid healing of tree wounds. (2) Doesn't crack or blister. (3) Retains its easy-to-apply qualities even under freezing temperatures. Available in liquid form for wound dressing or plastic form for tree surgery.

PLASTIC TREE WIRE GUARD — Made of rugged, flexible, lightweight, clear plastic, this Detroit-Macoid wire guard is excellent for use on drop wire for protection against abrasion where adequate clearance from trees is impracticable to obtain. Linemen easily can thread the plastic helix over an end of the wire during installation or spiral it on the wire when the wire is already in place. Available in 3-ft. lengths. 4565

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Bell System's Two Billion Dollar Post-War Expansion Program

THE Bell System is mapping a two billion-dollar post-war construction program which will provide additional jobs on a large scale in the manufacture, installation and operation of telephone equipment, Vice President Mark R. Sullivan of the American Telephone and Telegraph Company revealed August 8.

The record construction program is aimed at meeting the backed-up demand for telephones, adding new service and extending and improving services. It calls for an estimated expenditure of a billion dollars almost immediately after the war and another billion dollars within a very few years. At the peak year, it is likely that expenditures for construction will be as great as $650,000,000, which is 50 percent higher than the highest year immediately preceding the war. Just when this peak will be reached depends upon how fast manpower, materials and manufacturing facilities become available.

Not all of the many projects involved will be undertaken at the same time. At first the emphasis will be to catch up on the essentials necessarily suspended during the war period. As this work progresses, emphasis will shift to service improvements and extension of services.

Mr. Sullivan gives a bird's-eye-view of the road ahead by listing eleven outstanding projects in the construction program:

1. Catching up with requests for services now held in abeyance because of lack of facilities.

   "The first aim," Mr. Sullivan asserts, "will be to provide service without delay, for all who wish it." At the end of June the Bell System companies were holding 2,014,000 applications for main telephone service for lack of facilities. In addition, there is a backlog of other requests for service including particularly 400,000 requests for residence extension telephones.
2. Catching up with plant shortages to provide for the volume of business presently being handled.

   Additional central office equipment, particularly dial, will be necessary to restore pre-war speed of service on local calls and to absorb temporary peaks in traffic. An increase of approximately one-third in the present circuit mileage is estimated to be needed to restore pre-war speed of toll service. It is planned not only to reestablish, but to improve upon that speed.
3. Replacing temporary expedients adopted only for the war period.

   An example is 800,000 telephone sets of pre-war types, which normally would have been junked but which had been saved for the war emergency and put back in service.
4. Improving equipment on customers' premises.

   This involves replacing manual PBX's with dial PBX's, key sets in place of older types of wiring plans with separate keys, new types of intercommunicating equipment, improved types of colored handsets, etc.
5. Strengthening the long distance network, including provision for television and the use of radio facilities.

   Plans have been made for installing about 10,000 additional route miles of toll cable during the next several years. Included will be a new transcontinental cable (coaxial) across the southern part of the country and a north-south backbone cable from Chicago and St. Louis south to New Orleans. In the expected future art, the wide transmission band of the coaxial system will accommodate several hundred telephone cnversations and one two-way television channel at the same time over each pair of coaxial conductors.

   The coaxial cable on the main routes will include six or eight coaxial units, and in some sections a number of pairs of wires in addition, according to the estimated need for circuits. Thus the plans already made are sufficient to provide the nucleus of a nation-wide television network.

   Plans have been made and approvals granted for installation of an experimental radio relay system between Boston and New York. This high frequency-line-of-sight transmission system is expected to provide circuits suitable for both telephone and television transmission. The Bell System is interested in the best type of transmission, whether it be by wire or radio, and depending upon the results of the New York-Boston experiment, radio circuits for telephone and television may find wide-spread application in the Bell System.
6. Extension and improvement of rural telephone service.

   After the war the Bell companies expect to resume their active program of extending service to rural homes, with the expectation of rapidly increasing the number of farm telephones. Several recently developed types of facilities will be featured: high-strength wire making possible long-span construction, "carrier" systems which can be superimposed on either power or telephone lines, and ultra-high frequency radio.
7. Replacement of manual equipment by dial equipment for local service.

   After the war the Bell companies propose to go forward rapidly in replacing manual switchboards by dial equipment for exchange service. When this work was suspended by the war, about two-thirds of all Bell telephones were dial operated.
8. Provision of equipment for operator dialing on toll circuits.

   It is expected that the Bell companies will proceed rapidly to equip a high percentage of all toll circuits for operator toll line dialing. The equipment enables a long distance operator at the originating end to complete a call to a subscriber at a distant point

without calling on the services of an intermediate operator.

9. Subscriber dialing of toll calls.

   Present automatic ticketing of short-haul toll calls will be supplemented after the war by the application of developments now under way which provide for automatically preparing a record of a toll call dialed by the subscriber without any help from the operator. The record automatically prepared will contain all the necessary information, including the calling and called numbers and the length of conversation. This system is expected to have wide application in metropolitan areas.

10. Extension of services—service to motor vehicles, overseas radiotelephone service, etc.

    It is hoped, shortly after the war, to make installations for vehicular telephone service in a number of cities. Highway mobile service is also contemplated.

    Plans have been made for a considerable expansion of overseas radiotelephone service, including additional circuits to points heretofore served and new cricuits to many points not now served directly. With the growing community of interest between nations, the potential capacity for the development of overseas service appears to be large, perhaps beyond present plans.

11. Provision for growth.

    If the demand for net additional telephones should be as high as that experienced in the last 10 years—about one million per year—expenditures for new construction of about $300,000,000 per year will be necessary for that purpose alone, and any additional growth resulting from a further stepped-up national economy will add to that huge amount.

"Looking ahead," Mr. Sullivan concludes, "the stage is set for expanding activities; and in the telephone industry the proper marshaling of men, money and materials will speed up the realization of the much-to-be-desired objective—more service to the nation and more jobs for its men and women."

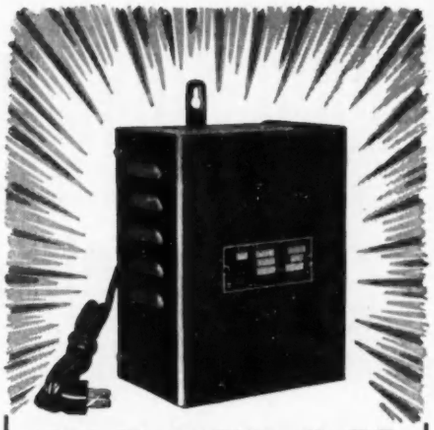
Decade Required to Restore Holland's System

At least ten years will be required to restore Holland's automatic telephone network, so badly damaged did the Germans leave it, J. L. Van Bijlert, chief engineer of the Netherlands Telephone Department, and R. Diks, an engineer in that office, have reported. It appears that the Germans followed a set plan in wrecking vital portions of the nation's system, once the most highly-advanced telephone network in the world, the engineering specialists said. As they retreated they destroyed or damaged all main telephone offices, by-passing lesser points.

FCC Officials to Hawaii

FCC Commissioner Paul A. Walker and chief accountant William J. Norfleet flew to Hawaii August 4 to engage in a study and negotiations with the A. T. & T. and Mutual Telephone Co. of Hawaii on the telephone rates between the Hawaiian Islands and the United States mainland. They were accompanied by assistant vice president William G. Thompson of the A. T. & T. Long Lines Department in charge of overseas telephone service.

Commissioner Walker and Mr. Norfleet expect to remain in Hawaii about two weeks. They had been scheduled to leave July 27, but the pressure of other Commission matters prevented their departure. In addition to the question of the mainland Hawaii telephone rates and conferences with the Hawaiian utilities commission, the two FCC officials will also survey the cable and radiotelegraph facilities and services in the Territory of Hawaii.



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Guam Has Automatic Telephone System

One of the native girls, whose transportation from their homes throughout the island to work and return is furnished by the Marine Corps each day.

LESS than a year after reoccupation, Automatic telephones have come to Guam.

When the island of Guam, the headquarters of Admiral Nimitz, Commander-in-Chief of the U. S. Pacific Fleet and Pacific Ocean Areas, was secured August 10, 1944, from the Japs, the telephone system was very meager. It consisted of two field boards located in foxholes with corregated metal roofs to keep out the rain, one was at Peti, the other at Agana. Later a Jap telephone exchange was repaired and put into operation as new cables were run around the island and through the jungle. Some of the uncaptured Japs that still remained on Guam would come out at night and cut small sections, one or two feet long, out of the new cable, thus slowing down the progress of the new system.

At one of the seven exchanges now on Guam, Native girls operate the five position board that has a capacity of about 1400 lines. Between 1830 and 0630 the Army operates the boards at the various exchanges.

Little by little the system grew until Guam now has seven exchanges such as ATlanta, BOston, CHicago, DEnver, ERie, FResno, and GEorgetown. At Atlanta it is just like a miniature exchange on the mainland using a Strowger Automatic system. They have a five position board with the capacity of about 1400 lines. With sixteen native girls operating the board, working in two shifts from 0630 to 1230 and from 1230 until 1830. The girls live on all parts of the island and their transportation is furnished from their homes to work and return by the Marine Corps. After 1830 until 0630 the boards are operated by the Army.

Some of the equipment on Guam that the U. S. moved in after August, 1944. When the Japs moved out they left a scant system of two field boards located in foxholes, one at Peti and the other at Agana. Now even outlying villages on Guam have their own magneto telephone system.

The rest of the plant is run by nine men under a wire chief, and with twelve men working outside as installers and repairmen, so with the coming of the rainy seasons these men will have their share of work. The outlying native villages also have their own magneto telephone system. Under the supervision of the Military Government the natives have strung up their own telephone system through the jungle with the wires being lashed to the trees, with each village having one telephone.

L. C. Whitcher Passes

Lamar C. Whitcher, 55 Stevenson Road, Hewlett, Long Island, General Commercial Manager, Manhattan-Bronx-Westchester Area, New York Telephone Company, died suddenly Wednesday (August 1), while returning home from his office at 140 West Street, Manhattan.

L. C. Whitcher

Mr. Whitcher was born September 15, 1882, at Landaff, N. H. Before entering the telephone business on March 1, 1902, Mr. Whitcher was a news reporter on the Salem *Evening News* and the Boston *Transcript*.

His first position with the telephone company was that of a lineman in Burlington, Vt. Following this he became chief operator; superintendent for the State of Maine, and Division Traffic Superintendent for Boston and Eastern Massachusetts. In 1920 Mr. Whitcher was transferred to the New York Telephone Company as Division Superintendent of Traffic, Southern Manhattan; and in 1923 was appointed Superintendent of Traffic for the Long Island Area. He became Division Manager of the company's Bronx-Westchester Area in 1927, and successively was appointed General Commercial Manager, Bronx-Westchester, and later to the same position on Long Island; and on August 31, 1942, to his present position as General Commercial Manager, Manhattan-Bronx-Westchester.

Radio Communications Laboratory Car on Demonstration

Hitchhiking its way over three U. S. railroads and one Mexican line, the Aireon Manufacturing Corporation's railroad laboratory car left August 1, for Mexico City where it will be used to demonstrate the corporation's railway communications equipment on the National Railways of Mexico.

The first leg of the trip was made via the Kansas City Southern as far as Texarkana, where the car picked up the Texas and Pacific to Longview, Texas, then the Missouri-Pacific to Lorado where the National Railways of Mexico picked it up for the remaining 28-hour run to Mexico City.

The all-steel car has been completely remodeled and equipped with ultra-high frequency "space" radio telephone units, and inductive or "carrier" type equipment. It is used entirely for test installation runs on railroads interested in installing radio communications equipment on their trains. U. S. roads with Aireon equipment already installed or in process of installation on their system include the Kansas City Southern and the New York Central. Aireon railroad radio equipment is being used in test runs on other major carriers as well.

The trip is under the supervision of Samuel W. Fordyce, III., general manager of the railway equipment division of Aireon, manufacturers of radar, electronics and railway communications equipments. Niebert J. Johnson, assistant to Fordyce, and six Aireon radio engineers were on board.

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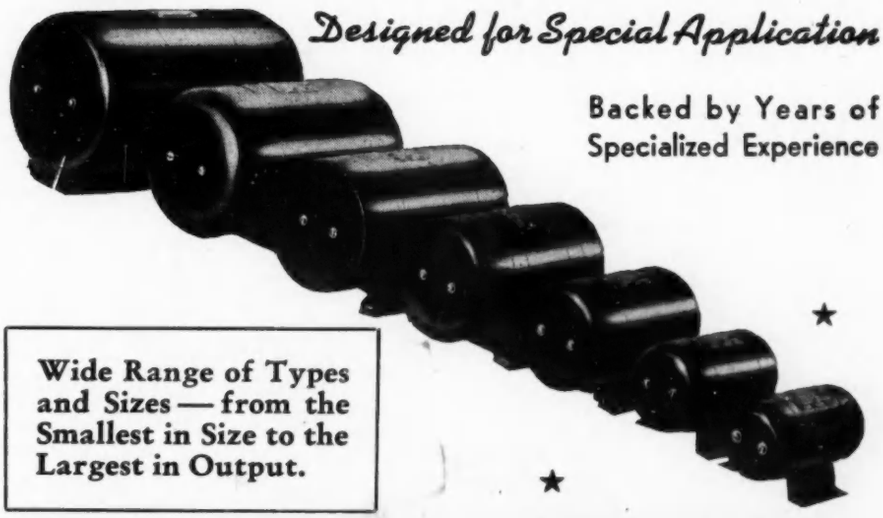

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Conference on Rural Problems in Illinois

ANOTHER step in the Illinois Telephone Association's program of research in the rural telephone problem, was the first "Grass Roots" Rural Telephone Conference conducted in Pekin, Tazewell County, this summer, under the auspices of the Association's Rural Service Committee, of which Harry Bates of Dixon is chairman.

This meeting was different from former telephone group meetings in that it brought together representatives of more of the people who are most concerned about the solution of the rural telephone problem. Beginning with the farmer himself, and officials of his principal service organization—the Farm Bureau—the meeting included representatives of farm service lines, small mutual exchanges, and other exchanges operating in Logan, Mason, McLean, Peoria, Tazewell and Woodford counties, with members of the Rural Service Committee and equipment manufacturers' representatives serving principally in the role of most attentive listeners.

Verne B. Clark, district manager of the Middle States Telephone Company of Illinois, Pekin, acted as chairman of the meeting. In his opening remarks, Mr. Clark spoke of the probability that post-war developments in commerce and industry in the line of new products, new comforts and conveniences and speedier transportation would affect every village in America and would raise the standard of requirements for telephone communication generally.

He spoke of the definite plans which had been made in large and small companies for improvement and extension of telephone service in rural areas, but emphasized the fact that the effects of war-time inflation is causing grave concern among telephone people in large and small exchanges: "Since it has been the history of every war that the tendency is for costs to reach new high levels, and having in mind that telephone people are the only ones who have traditionally furnished much free service to 'borrowers' and at the same time have had to go through slow and expensive processes to secure rate relief, we really have something to think about today."

The first speaker was Clarence Bayles, County Farm Bureau Agent of Tazewell County, a county in which 63 per cent of the farmers had telephones according to the 1940 agricultural census. Mr. Bayles expressed what he believed to be a growing attitude on the part of the American farmer when he said:

"A lot of farmers have tried their hands at keeping up a telephone line and are about ready to admit that they are better farmers than they are telephone people.

"Good telephone service has always been important to the farmer, but I do not believe you telephone people have ever made a sufficiently concerted effort to drive that fact home to the farmer.

"His time is more valuable today than ever before. He realizes this, and he also realizes that trying to do without a telephone during the depression was a bad bargain for him."

Mr. Bayles further touched directly on the demands of the farmer for better telephone service after the war.

"During the present war, the farmer's income has shown an improvement over 1940. However, he does not know what postwar economic developments will do to him. In this connection, I believe that three members of your Rural Service Committee came to a Tazewell County Farm Bureau meeting last winter to hear the address of Mr. Earl Smith, president of the Illinois Agricultural Association. I understand that you gentlemen were greatly impressed with Mr. Smith's statement that, since 82 per cent of all new wealth created each year comes from farms, we need not fear our ability to pay interest on the post-war debt, if post-war farm prices are at the proper level and in proper relation to all others. Let's hope it will work out that way.

"In any case, the young generation of farmers especially will realize the need of good telephone service after the war, **and they will be just as willing to pay a reasonable price for good service, as will any other people.**

"We can suggest one thing to you telephone people, however, that you might think about. The boys who came back from the last war demanded better automobiles and they got them. Even today the airplane is being used in farm operations in some sections, and we know that many of our farm lads are going to be air-minded when they come back from this war.

"Doubtless you people will have to continue improvements in order to sell them successfully.

"The telephone industry is represented on our commercial membership lists. We feel that such memberships indicate a desire for a better understanding of the farmer's problems in order to be able to serve his needs."

The second speaker of the meeting was I. E. Wilson, manager of the Cummings Estate Farms, Pekin. As manager of the extensive Cummings farm properties in Illinois, Iowa and Kentucky, Mr. Wilson has long had occasion to come in intimate contact with the telephone industry. He has seen the need for improved rural telephone service, but he expressed what he believed to be the typical view of the American farmer when he warned

Whenever possible wire is always tied above ground, and here in a Pacific island jungle our Signal Corpsmen tie 110-B wire to the many trees along the trail and lay wire with an RL-27A. Signal Corps photo.

against allowing politicians to invade the telephone industry:

"I heard of something which has come up recently which I fear is not good for the country as a whole, and it has caused me to inquire into the problems of the telephone business in agricultural communities. I have reference to the talk that politicians in Washington might be edging more into this important field of industry in everyday life.

"I do not know whether or not there are rural telephone problems so serious that you telephone owners cannot get together and solve them yourselves. But we do know that everytime we fail to co-operate to do a job properly ourselves and finally the politicians get their hands in the picture, there are certain tendencies very bad in the long run for all of the people.

"We know that there never has been an example of thoroughly honest, efficient and progressive political management and operation of anything. Do any of you think for a moment that any of the modern things we have today, including the telephone system, would be ours today if we had always had to depend upon political bodies for the vision, the courage and the ability to provide them for us . . .

"As one layman citizen, however, I hope that you telephone people can work out the rural problem in such a manner that we will not see big politics gnawing into another vital everyday necessity of life. According to history, it is very, very dangerous to the interests of the country as a whole."

The opening discussion of the meeting presented a problem typical of the difficulties which face the small exchange operators regarding rates and rate increases. An Association member asked for advice regarding his purchasing a neighboring switchboard, 82 telephones and 50 miles or so of pole line. The member expressed doubt as to whether present subscribers now paying a 25-cent or 30-cent switching charge would voluntarily consent to pay a $3.50 business rate or $2.00 residence rate. The member was shown that it would be unprofitable for him to assume operation. Mr. K. L. McKittrick, assistant general manager of the Wabash Telephone Company, Bloomington, Ill., suggested that the Association's survey method developed by the Rural Telephone Service Sub-committee be used by exchange owners to estimate number of subscribers as well as exchange revenue and the amount of new capital required to rebuild the plant.

The principal subject of discussion grew out of a relating of the difficulties besetting a Mason County telephone exchange. The principal owner brought two farm representatives to hear what was planned for farm telephone users after the war. Mr. D. Montgomery, a Mason County farmer representing the Prairie Creek Telephone Company, expressed the willingness of the farmers on his 26-station line to pay for repairs through an annual assessment. He expressed dissatisfaction with the present service as did Mr. Samuel Brooks, a farmer representing the Salt Creek Mutual Telephone Company. Mr. Brooks expressed a view similar to Montgomery's regarding the farmers' willingness to pay for repairs on their line. He willingly acceded to the suggestion and motion later made by R. B. Still, general manager, Wabash Telephone Company, that the Association appoint an investigating committee to go to the exchange and check on the service of Mr. Brooks' Salt Creek company with a view toward making recommendations for the best method of keeping the line in the best possible state of repair.

The presence of the two farmers at the meeting provided an excellent opportunity to question them regarding the farmers' willingness to voluntarily accept a rate increase to insure better service. Mr. Montgomery said he believed a direct approach to the farmer would not be successful at the present time but that an advertising program that told the farmer or his wife why the telephone company needed more money to give him the type of service he wanted would have good results.

Another topic discussed at the meeting was the advisability of having a uniform system of auditing for all the telephone company books. This issue was raised by Harry H. Bates of the Dixon Home Telephone Company and was enthusiastically agreed to by many of the members present.

The meeting ended on a final note of resentment against government entrance into the telephone industry. When the two Mason County farmers were asked if they wanted a government loan to enable them to repair their telephone facilities, they both answered strongly in the negative . . . Mr. Montgomery saying that his farmers were able to pay for their own repairs on the spot and did not want to go any further into debt to the government . . . Mr. Brooks said emphatically: "No! That's just another racket!"

Stringing wire over rough terrain in Australia, our telephone boys in service can now realistically think about stringing it again at home. With much postponed maintenance to be done and extensive expansion plans made, there will be great activity at home. Signal Corps photo.

Colonel Wm. C. Henry

Completes War Duties

Col. W. C. Henry

COLONEL Wm. C. Henry of Bellevue, Ohio, returned to his home on August 2nd, from military service in Germany. He was a member of the staff of Supreme Headquarters, Allied Expeditionary Force, which ceased early in July. Following the establishment of communications facilities for the Big Three Conference in Potsdam, Germany, Colonel Henry returned to this country and will be released from the army on August 31st. He will immediately resume his civilian duties as general manager of the Northern Ohio Telephone Company.

In recognition of his outstanding service as Chief of Telecommunications, on the staff of General Eisenhower, Colonel Henry was honored with high military decorations from three of the Allied Nations. Before leaving Germany he received the United States "Legion of Merit", the British "Order of the British Empire" and the French "Croix de Guerre with Palms." In addition he wears campaign ribbons for the Pacific, American and European Theatres, the latter with three battle stars.

The following citation accompanied the award of the Legion of Merit decoration.

"Colonel William C. Henry (Army Serial No. O166622), Signal Corps, United States Army, for exceptionally meritorious conduct in the performance of outstanding services as director of the Allied Expeditionary Force, Long Lines Control, Signal Division, Supreme Headquarters, Allied Expeditionary Force, from March 1, 1944 to May 8, 1945. Colonel Henry was responsible for the timely installation and efficiency of the over-all signal telecommunications system in the Supreme Command, as well as controlling the construction, rehabilitation, maintenance and allocation to all military users of long lines communications facilities in the liberated countries of France and Belgium. Through his personal efforts in dealing with the French P. T. T., Colonel Henry insured that the utmost assistance was given by that organization to the rehabilitation of the French civil communications network. Through his technical qualifications, enthusiasm and devotion to duty which distinguished his work, he materially aided the Allied Military operations. Entered Military Service from Ohio."

Colonel Henry returns to civil life after completing forty-four months of military service in this war. He was commissioned a lieutenant-colonel in February, 1941, as the representative of the Independent Telephone Industry on a five-man Communications Board which served in an advisory capacity to the chief signal officer of the Army.

CALLED to active duty on November 9, 1941, almost a month before Pearl Harbor, Colonel Henry served for eighteen months as liaison officer of the Independent telephone industry with the War department. In this capacity he handled problems in connection with the establishment of army camps, defense plants and induction centers in Independent telephone territory. As one of the official rating officers of the Army he interviewed and recommended for commission as officers in the Signal Corps more than six hundred qualified telephone men. It was largely through his efforts and assistance that the Independent industry, through various state associations and individual companies, sponsored and provided the officers and technician personnel for eighteen Signal Corps units.

In August 1942 he was promoted to the rank of full colonel and saw service in Alaska, South America, North Africa, England, France, Belgium and Germany. In the course of his military assignments he has flown the Atlantic eleven times.

Assigned to the staff of Supreme Headquarters, A. E. F., early in 1944 Colonel Henry assisted in planning communications for the invasion, including the laying of new coaxial cables between England and the Continent. The first one of these cables was placed in service on D plus three days. Following the Allied break through in Normandy in the early fall of 1944, the Supreme Commander assumed control of all commercial communications facilities in France and Belgium. In August last year Colonel Henry was appointed director of A. E. F. Long Lines Control, in charge of all military telephone and telegraph lines in France and Belgium, in the rear of army groups. A. E. F., Long Lines Control, with principal offices in Paris and Brussels, established more than ten thousand separate military circuits with a total mileage of over 826,000 miles. This network of lines provided the Allied Armies with a scale of communications far in excess of those ever provided for any other military operation.

IN World War I, Wm. C. Henry enlisted as a cadet in the British Royal Flying Corps, at the age of eighteen, and prior to the entry of the United States into that conflict. He served with the British as a pursuit pilot for a period of twenty-four months, attaining the rank of captain. His eldest son, Frank C. Henry, following in his father's footsteps, recently won his "wings" and commission as a second lieutenant in the United States Army Air Forces.

Colonel Henry has for the past twelve years been a director of the USITA. He has taken an active part on various committees of the Association and is at present its first vice-president. While in military service he was on leave of absence from his position as secretary and general manager of the Northern Ohio Telephone Company with general offices in Bellevue and forty-eight exchanges in North Central Ohio.

As its official representative in the Signal Corps the USITA is proud of the contribution which Colonel Henry has made toward the successful conclusion of the European war and the distinguished military service record with which he re-enters the active field of telephone management.

SAFETY DEPENDS ON A BIT OF METAL

Safety Depends on A Bit of Metal

The spur in a lineman's climbers is a ***little*** thing in size—but a ***big*** thing in safety.

BUCKINGHAM concentrates 40 years of know-how in the making of climbers and other safety equipment.

BUCKINGHAM never neglects those important ***little*** things. You can depend on BUCKINGHAM Equipment.

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INVEST YOUR "PIN MONEY" IN THE BEST

LOCUST PINS

Locust wood is practically impervious to decay and is impenetrable to moisture. Because of its close-grained hardness locust can be machined into strong, long lasting pins of standard specifications that can be counted on to retain their size and shape.

OAK BRACKETS

Oak pole brackets of unquestioned quality are in demand now as never before in the face of the qualifications necessary in the equipment and materials needed today to "keep 'em talking." Present day maintenance and repair have every reason to demand and get only the best.

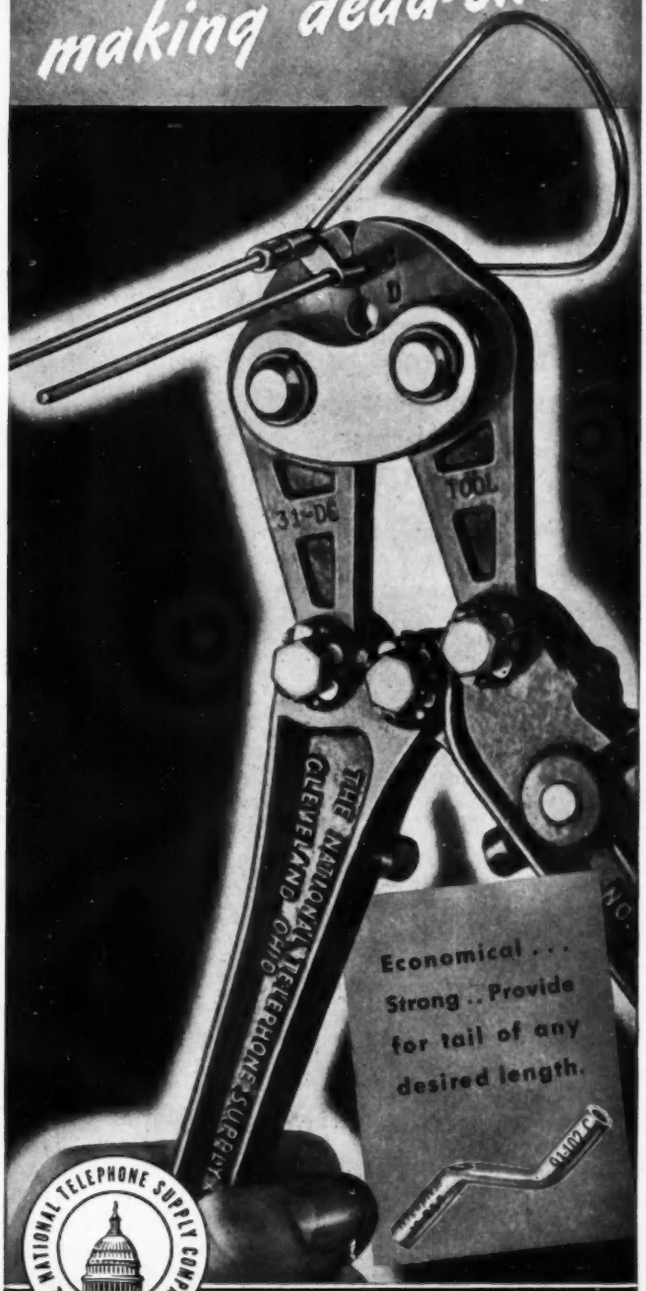
GLASS INSULATORS

Research and experiment have produced in Hemingray insulators a glass insulator that is better than any ever before offered.

Non-porous, non-deteriorating, uniform coefficient of expansion and high mechanical as well as high dielectric strength are some of the many qualities that rank Hemingray the "best on the line."

BUCKEYE TELEPHONE and SUPPLY CO.
COLUMBUS 6, OHIO

You can't beat the *Nicopress* method of *making dead-ends*



The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO
Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA
Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

Southwestern Bell Official Dies Suddenly

William L. Holley, first vice president and a director of the Southwestern Bell Telephone Company, died unexpectedly of cerebral hemorrhage at his home in St. Louis July 31. He was 57 years old.

He had been first vice president of the Southwestern Bell since 1940 and had been elected a vice president of the Company in 1937. Mr. Holley this year had rounded thirty-five years service with the Bell System. He joined the Southwestern Bell in 1921 as General Traffic Supervisor and had been in St. Louis continuously since then except for a year in the Engineering Department of the American Telephone and Telegraph Company in New York. On his return from New York in 1928 he was appointed General Traffic Manager of Southwestern Bell.

Schollhorn Names Former Aircraft Executive General Manager

Wm. Schollhorn Company, New Haven, manufacturers of the BERNARD line of parallel action pliers and related tools have announced the appointment of Mr. H. J. von Plonski as General Manager.

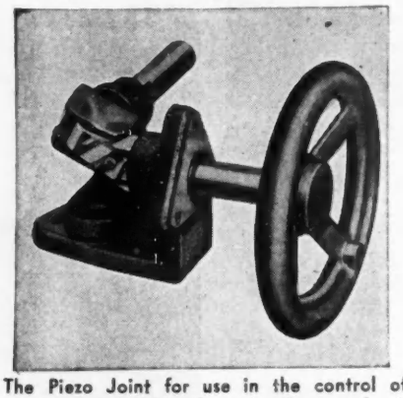
Mr. von Plonski, a graduate of the Columbia University School of Engineering, brings to Schollhorn a wide and aggressive experience in the fabrication of tools and metal parts, most recently in the aircraft industry.

During the war production program Mr. von Plonski's talents were employed in an executive capacity on such vital jobs as aircraft production, ordnance and aircraft accessories for the U. S. Government, for McDonald Aircraft Corporation and General Aircraft Equipment Corporation.

The appointment of Mr. von Plonski, one of the youngest men who has ever managed the 75-year old Schollhorn organization, signalizes a progessive development of their postwar business.

Piezo Universal Link Joint

The Piezo Universal Link Joint is a new remote control product recommended for hand operation and slow speed power drives, such as those used in the control of electrical switchboards, radios, automatic machinery, valve operation and many other mechanical devices. It features an adjustable link mechanism to transmit rotary motion around corners, permitting the operation of shafts at angles adjustable from a straight line to a right angle. With the use of solid shafting and the absence of flexing or backlash this makes a good method for accurate remote controls and the simplicity of installation makes it preferable to bevel gears, racks, toggles and other mechanical equipment usually employed for this purpose.



The Piezo Joint for use in the control of electrical switchboards and other mechanical devices is described with specifications in a four page folder which any reader may have by postcard request to the New Products Editor.

An important feature of this Piezo Joint is the fact that the output shaft turns in the exact angular rotation as the input shaft, giving an input turning angle. This is of particular importance in dial settings and where uniform motion is desired.

The joint, manufactured by the Piezo Electric Corp., is mounted by means of three screws which hold it in position. The bearing arm which holds the adjustable shaft may be hinged to any desired position from 0° to 90° and when in its proper location, a locking screw permanently holds its position.

Petitions Granted to John T. Detchon Interests

The Public Service Commission of Indiana has granted the petition of the State Line Telephone Corporation and the Indiana Western Telephone Corporation that a true value of acquired property be fixed and that authority to issue no par value common stock be granted; the petition of the Coal Creek Telephone Corporation and the Wabash Prairie Telephone Corporation for authority to issue no par value common stock and exchange such stock for physical property owned by the Union Telephone Company and the petition of the Union Telephone Company for authority to transfer physical property to the above corporations for all of the common stock of said corporations. The companies involved in these petitions are owned by The John T. Detchon interests.

Synthetic Rubber Insulation

Wi'espread postwar use is expected for a synthetic rubber latex insulation for electrical and communications wire developed during the war by the United States Rubber Company, reports C. W. Higbee, manager of the company's wire and cable division.

The new insulation, Nubun, is now being used exclusively on wire produced for the Army and Navy. After the war it will be available for insulating wire needed in the construction and remodeling of homes and other buildings in the United States and in foreign countries.

The insulation is applied by a continuous dipping process perfected by the United States Rubber Company. The process can be used on all types of wire and cable having conductors ranging in size from number 10 to number 22 American wire gauge. It permits the production of wire which is small in diameter and light in weight, yet possessing superior electrical properties and flexibility.

Appointed to Board

Frederick Colin Burstall has been appointed to the Board of Automatic Telephone & Electric Co., Ltd., Liverpool.

F. C. Burstall

Previous to joining the Company in 1931 Mr. Burstall was Deputy Inspector General of the Egyptian State Railways Posts and Telegraphs, to whom he was seconded from the British Post Office in 1925.

The son of Frederick Hampton Burstall, first organist of the Liverpool Cathedral, Mr. Burstall was educated at Magdalen College School, Oxford, and commenced his career in telecommunications with the National Telephone Company in 1904. He is Chairman of Hivac Ltd., and a Director of Elexcel Ltd.

Nebraska Chief Operator Cited for Emergency

Mrs. Clara E. VanMatre, chief operator of the Rising City, Nebr., exchange of the Lincoln Telephone & Telegraph Co., has been cited by company officials following her emergency actions during a tornado which struck July 4.

Clara E. VanMatre

The tornado struck shortly after 7 P. M. about two miles west of Rising City, tearing out toll and farm lines and resulting in the deaths of seven persons, injury to many others and widespread damage to property. The exchange of Surprise was in the direct path of the storm and was completely isolated from telephone contact with surrounding towns.

Mrs. Van Matre first learned of the disastrous results of the storm when a local cafe operator called to inform her that several persons had been killed and injured in a tornado west of town. She immediately contacted local authorities and summoned medical and ambulance service from adjoining towns. Always on the alert, she had noticed the Rising City physician stop up the street from the central office a short time before and although the home was without telephone service, she succeeded in reaching him through a messenger and notified him of what had taken place.

The telephone office became the hub of the community's relief efforts with many persons crowding its interior throughout the night in efforts to summon assistance and notify families of those who had suffered casualties in the storm. All circuits west of the exchange were severed. However, Mrs. VanMatre managed through circuitous routes to reach all desired points and a record high of fifty long distance calls were completed. This was in addition to many incoming calls which were received. The emergency condition continued throughout the night and Mrs. VanMatre stood by her post until eight the following morning without relief. Her presence of mind, patience, and untiring efforts during the emergency brought many expressions of gratitude and appreciation from the local townspeople and others whom she had served.

A letter of commendation was written by district manager John A. McKinzie and was as follows:

"The manner in which the increased traffic burden caused by the storm on July 4 was handled at Rising City, prompts an expression of appreciation to you and your helpers for an outstanding performance which was handled under unfavorable conditions.

"I personally received a number of compliments from customers on the manner in which their calls were handled during this emergency.

"Our General Traffic and General Commercial Superintendents join with me in this commendation."

Ground rods drive without bending

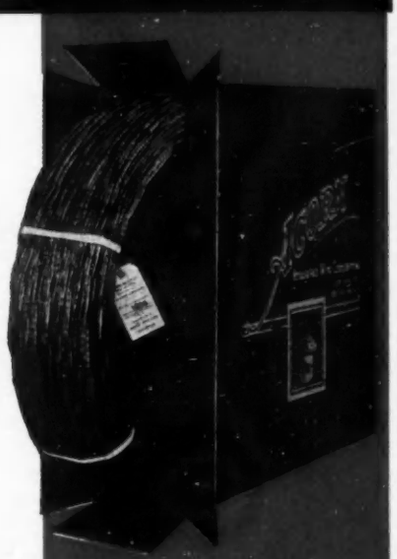
The Chance Ground Rod Driver is a handy tool for making ground rod installations. The tubular handle when telescoped over the ground rod supports the rod and prevents buckling or bending while the driver is raised and dropped like a pile driver. A section of the tubular handle may be removed so that it is possible to drive the rod within 2½ feet of the ground level. The short section may then be used as a sledge as illustrated. Total weight of this tool is 14 pounds. Here is the simplest, quickest method for making ground rod installations. Write for details.

A·B·CHANCE CO. CENTRALIA MISSOURI

ACORN INSULATED WIRE

TODAY TELEPHONE WIRE has to be tough

Many years of specialization in the manufacture of communication wire has built a performance record for Acorn Drop Wire.



ACORN INSULATED WIRE COMPANY, INC.
225 King Street, Brooklyn, N. Y.
LEICH SALES CORP., 427 W. Randolph St., Chicago
LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland

PREVENT ACCIDENTS! ACORN'S exclusive Carton Packaging for Safety and Better Warehousing.

Drop Wire—Bridle—Interior—Tree—Ground—Switchboard—Pothead—Cable Terminal—Instrument—Fixture—Buried Wire

Buys So. Dakota Exchange

The Citizens Telephone Company of Plankinton, S. Dak. changed hands during July when Ben Hall, of Avon, sold his full interests to James Tobin. Tobin, now general foreman of Douglas Aircraft Co., Tulsa, Oklahoma, took possession August 1, but Hall will continue to operate the plant for him until he can secure his release from the aircraft industry.

Horton Named President of Great American Industries, Inc.

The board of directors of Great American Industries, Inc., with offices at 70 Britannia Street, Meriden, Connecticut, has announced the election of Ralph Horton of New York City as president to succeed Harold W. Harwell, who resigned July 13th.

One of his first acts after accepting the presidency of G. A. I., was to announce the appointment of Frank W. Watts as general manager of the Connecticut Telephone & Electric Division in Meriden and the Rutland Electric Products Division in Rutland, Vermont. Mr. Horton also stated that he will remain in New York in the offices of Great American Industries at 247 Park Avenue.

Frank W. Watts

Mr. Watts, who will make his headquarters at the home of the Connecticut Telephone & Electric Division in Meriden, was vice-president in charge of sales at C. T. & E. and also vice-president of Great American Industries before his elevation to the general managership of the Connecticut and Vermont Divisions. A graduate electrical engineer and a Fellow of the American Institute of Electrical Engineers, he was formerly the operating head of one of the largest public utility companies in the east. Later he became a consulting engineer to numerous large corporations in the rearrangement of their electrical facilities.

Brett and Van Duzer Named by Ohio Bell

Frederick B. Brett, comptroller of the Ohio Bell Telephone Company, has been elected a member of the board of directors and of the board's executive committee, president Randolph Eide of the Ohio Bell Telephone Co. announced July 27. Ashley M. Van Duzer, the company's general solicitor, has also been elected general counsel of the Ohio Bell, succeeding the late Karl E. Burr, Mr. Eide disclosed.

Mr. Brett entered the telephone business as an office boy in 1900, and worked in accounting departments in Detroit, Chicago, and Indianapolis before going to Cleveland in 1914 as division auditor of receipts. He became auditor of disbursements and then chief accountant, and in April, 1944, he was appointed general auditor and comptroller.

Engaged in legal work for Ohio Bell for more than ten years and elected general solicitor in March, 1934, Mr. Van Duzer fills the position recently vacated by the death of General Counsel Burr. He will continue his partnership in the Cleveland law firm of McKeehan, Merrick, Arter and Stewart and George Williams Cotterell.

Telephone Engineer HANDBOOK TABLES

Subject—Wire Clearances (Continued)

Index—Outside Plant Design
Date—August 15, 1945

CLIMBING SPACE ON JOINTLY-USED POLES

To enable power linemen to climb post telephone circuits to reach the supply lines overhead on jointly used poles, sufficient space should be provided past the circuits. This space measures 30″ by 30″ and need be provided on one side or corner of the pole only.

The climbing space should not be considered to be obstructed by portions of the pole included in one side or corner of the climbing space or by vertical runs incased in suitable conduit or other protective covering and securely attached to the surface of the pole.

The full width of climbing space shall be provided past cable and drop wire or through open wire and shall extend vertically in the same position from 40 inches below to 40 inches above the telephone level.

On open wire lines carried on jointly-used poles, climbing space through the telephone wires to the supply conductors above is provided by utilizing "B" type crossarms which have pole pair pin spacing of 30 inches.

Climbing space on poles carrying a telephone bracket lead jointly with a supply line is provided by placing the brackets on either the road or field side of the pole leaving the other side unobstructed.

Jointly used poles with drop wire fixtures require climbing space at the fixtures to enable the power lineman to climb post without difficulty. This space is obtained by placing a guard arm on the cable to which the fixtures are attached as shown in Figure 4 (July Telephone Engineer). Drop wire fixtures should not be fastened directly to the pole except in pole-to-pole drop wire runs.

APPENDIX—DEFINITION OF TERMS

The following excerpts from the chapter on Definitions in the National Electric Code explain certain terms used in the data on Wire Clearances:

Conductor:

Lateral conductor means, in pole wiring work, a wire or cable extending in a general horizontal direction approximately at right angles to the general direction of the line conductors.

Vertical conductor means, in pole wiring work, a wire or cable extending in an approximately vertical direction.

Joint use means simultaneous use by two or more kinds of utilities.

Communication lines mean the conductors and their supporting or containing structures which are located outside of buildings and are used for public or private signal or communication service, and which operate at not exceeding 400 volts to ground or 750 volts between any two points of the circuit, and the transmitted power of which does not exceed 150 watts. When operating at less than 150 volts no limit is placed on the capacity of the system.

Electric-supply lines mean those conductors and their necessary supporting or containing structures which are located entirely outside of buildings and are used for transmitting a supply of electric energy.

Rural districts mean all places not urban, usually in the country, but in some cases within city limits.

Sag:

Final unloaded sag means the sag of a conductor after it has been subjected for an appreciable period to the loading prescribed for the loading district in which it is situated, or equivalent loading, and the loading removed.

Initial unloaded sag means the sag of a conductor prior to the application of any external load.

Span length means the horizontal distance between two adjacent supporting points of a conductor.

Urban districts mean thickly settled areas (whether in cities or suburbs) or where congested traffic often occurs. A highway, even though in the country, on which the traffic is often very heavy, is considered as urban.

Free Lists of Standards Ready

All American Standards and War Standards approved to date may be obtained from the American Standards Association, 70 East 45th St., N. Y. 17, N. Y. by postcard request.

The complete list of American Standards should be worthwhile reference material for engineers, linemen, purchasing agents, managers of telephone companies as well as manufacturers. It covers communications and miscellaneous industries.

WPB's Relaxation of Construction Controls

The steps announced in the War Production Board's Regulation 29, issued June 30, 1945, will soon abolish the use of preference ratings and allotment symbols, particularly on longer lead time items, and will thus permit communications and utilities to profit more fully from the relaxations in the controls of construction which WPB's Office of War Utilities adopted in June. OWU Director Edward Falck advised recently in an administrative letter to all utilities and communications companies.

In the transition from the present priorities system to one consisting of only two preference ratings—the present AAA rating and an MM rating reserved for military procurement—it has been possible for utilities to undertake expansions of facilities, except for construction of buildings, without specific authority from OWU, Mr. Falck wrote. Difficulties are being encountered in obtaining material and equipment to carry out much of this desirable construction without preference rating and allotment assistance, but the advantages, of such rating and assistance will soon disappear.

On January 1, 1946, the preference ratings and allotment symbols assigned by utility orders for maintenance, repair and operating supplies, and those specifically assigned for major construction on Form WPB 2774, will become invalid, the letter stated, along with all other AA preference ratings and allotments issued by WPB. Up to that time the AA rating system will remain in effect but only for 1945 deliveries. After October 1 all outstanding AA ratings become invalid on orders calling for 1946 delivery, except for those requiring long production.

Extension of Lines

The Minnesota Railroad and Warehouse Commission, July 17, granted the request of the Two Rivers Telephone Company of Lake Bronson, Minn. to extend its lines to render service within Lake Bronson State Park.

Authorized to Test Mobile Service at St. Louis

The Southwestern Bell Telephone Co. received the "green light" from the FCC Aug. 1 for the inauguration of tests of the urban mobile radiotelephone service in St. Louis.

Southwestern Bell was authorized to establish experimental Class 2 radio stations for one fixed land station and 12 portable-mobile stations, the latter to be installed on its own repair trucks and supervisors' cars. The company was permitted to operate the service to determine its technical requirements, equipment development, and engineering surveys to ascertain power needs but was denied its request to render service to others on a commercial basis. The service will be operated in the general vicinity of St. Louis.

This indicated that the FCC is still considering the idea of a future determination of whether urban and highway mobile service will be operated by common carriers or by the various interested vehicular organizations. The fixed land station is to be installed in the Southwestern Bell headquarters building at St. Louis, and will have 250 watts power, while the portable-mobile stations will have 15 watts.

ALL the strength and durability inherent in steel are combined---with definite economies---in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
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Doughnut Coils for telephone and electronic purposes. High Permeability Cores are hydrogen annealed and heat treated by a special process developed by DX engineers. Send us your "specs" today — ample production facilities for immediate delivery.

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DX COILS
"the heart of a good receiver"

Underground Conduit Construction

(Continued from page 36)

pulled-in. When underground conduit is used primarily for the main feeder cables, a distribution plan somewhat similar to that shown in Fig. 3 is used. Branch distribution cables are carried from the main underground feeder through a lateral duct-run and up a riser pole to connect to the aerial distribution plant. In a complete underground cable system distribution cables are carried through laterals with one or more drop distributing cable riser poles located in each block. A complete underground cable and drop wire distribution plant requires buried drops and underground cable terminals which are equipped with water-tight gaskets.

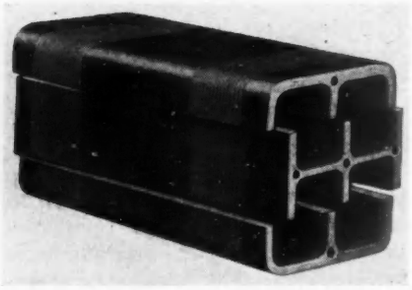


Fig. 8—Split Multiple-Tile Conduit. (Courtesy National Fireproofing Company)

Duct Materials

IF only a single duct run is required, many companies make use of ordinary 4 inch sewer tile laid up with mortar joints. While fairly satisfactory, sewer tile may have a rough bore which could result in damage to the cable sheath when the cable is pulled-in. Commercial one-way tile duct such as that shown in Fig. 4 and which is made especially for underground conduit purposes is preferable to sewer tile as it is smooth and free from imperfections on the inside.

Large duct systems make use of either vitrified multiple-tile duct of the type shown in Fig. 5 or tubular conduit of the impregnated fibre or asbestos-cement type as shown in Fig. 6.

Multiple-tile duct comes usually in 24 inch lengths although some types are available in 36 inch lengths. For best results multiple-tile duct should be laid on concrete pads and have a concrete cap as shown in Fig. 7.

The use of concrete pads insures accurate alignment and minimizes the possibility of adjacent conduit sections settling out of the line. Two iron dowel

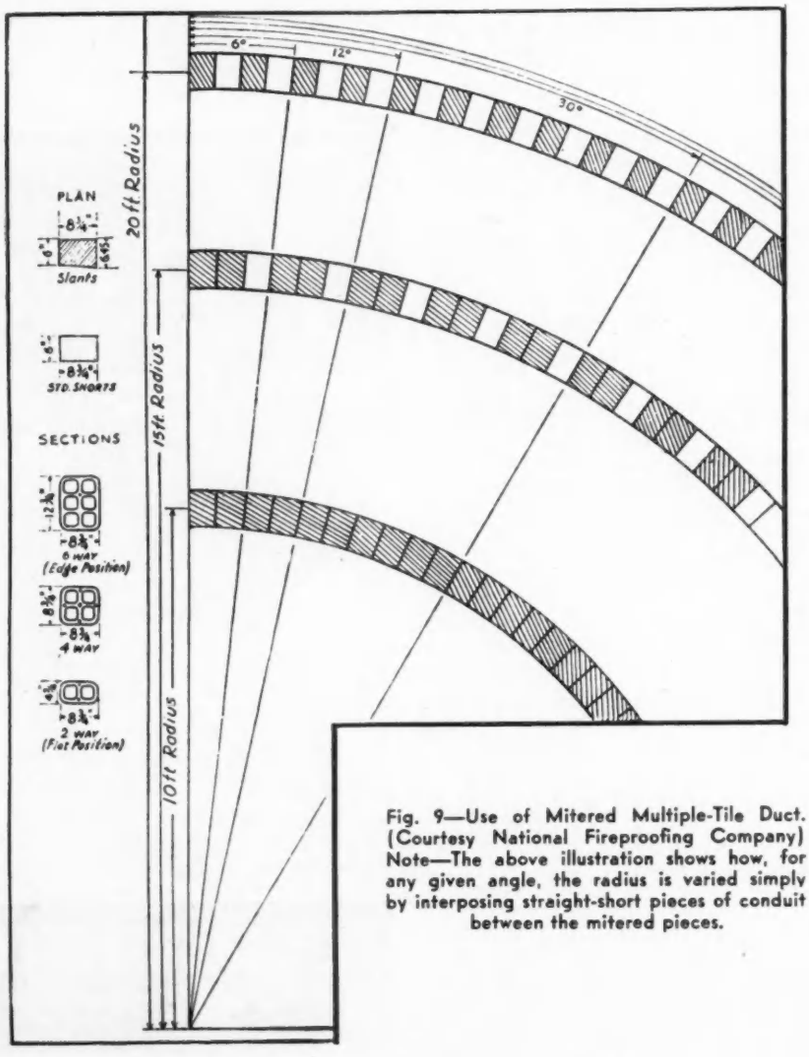
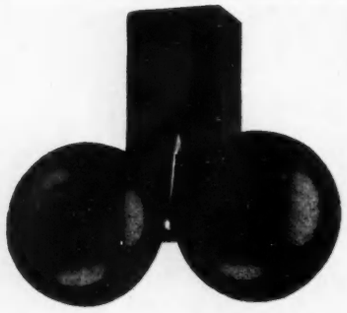


Fig. 9—Use of Mitered Multiple-Tile Duct. (Courtesy National Fireproofing Company) Note—The above illustration shows how, for any given angle, the radius is varied simply by interposing straight-short pieces of conduit between the mitered pieces.



Suttle Loud Ringing Extension Bell

This is an excellent bell for solving the needs of the subscriber in the garage, lumber yard, print shop, machine shop, or such place, who needs an extra loud telephone signal.

It is an all-metal outfit with deep-skirted, specially tempered six-inch gongs. Equipped with a special heavy ringer movement wound for either 1000 ohms or 1600 ohms.

Cat. No. 199 — Wound for either ohms, weighs 13 lbs. each—$7.45.

DEPEND ON SUTTLE

pins are used to line-up adjacent sections of multiple-tile duct. The joint is covered with cheese cloth or burlap and cement mortar applied.

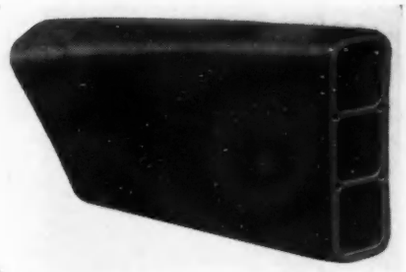


Fig. 10—Typical transposition 3-way clay conduit with a 22½ degree left hand twist and 24" long. (Also furnished in right hand twist)

Scored or Split Conduit

WHEN it is necessary to break into a duct run for repair purposes or when aerial cable is being lowered from a pole line into an underground trench, **split conduit** as shown in Fig. 8 is useful. Curves in sections of multiple-tile conduit can be made by means of mitered-conduit. **Mitered conduit** eliminates the need, at bends or turns and especially at approaches to central office for manholes. It also provides a means for changing the formation of duct banks without affecting the number of ducts. Fig. 9 illustrates the use of mitered conduit. Multiple tile conduit is also available in a **transportation-type** (see Fig. 10). This permits rearrangement of the duct system when underground street obstructions are encountered or when changing the position of the cables in the entrance to manholes, cable vaults, bridges, etc.

Tubular Duct

TUBULAR duct is available in both an asbestos cement and an impregnated fibre type. The fibre duct is impregnated with a hot coal tar pitch which is driven into the wood fibres by a special process thus insuring long life when buried in the earth. Tubular conduit is available in a 3½ inch diameter bore and it comes usually in 8 foot lengths. This type of conduit, because of its long length and smooth tight fitting joints may be laid directly on the bottom of a trench without the necessity of a concrete base. Tubular ducts are readily assembled by unskilled help, the main requirement being that the trench be properly graded between manholes. Two weights of tubular duct are available. The light weight type is generally used with complete concrete encasement. A special tool is available for cutting a taper joint on tubular conduit where less than a full length is required.

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USITA Tax Committee Issues Report

The Tax Committee of the U. S. Independent Telephone Association, headed by General Telephone President Harold V. Bozell, has just issued a report to the Association membership giving a general outline and suggested general solutions for Independent companies in presenting claims for relief from excess profits taxes under the provisions of Section 722 of the Internal Revenue Code, particularly as to securing relief on the basis of the change in toll settlements from the "board-to-board" to the "station-to-station" theory.

The Committee report stated that the replies to its questionnaire sent out last April had only come from 72 companies and, in general, the results of the questionnaire are disappointing. The report of the Committee cited toll settlement methods can only fall within sub-section 722 (b) (5). The other committee members are John H. Agee, Verne E. Chaney, Judson Large and John R. Porter.

N. M. Lash Dies

Norwood Maxwell Lash, former chief engineer of the Bell Telephone Company of Canada, died last week in Little Rock, Ark., at the age of 73. Mr. Lash joined the Bell Company in Toronto and helped form in Montreal the first engineering department of the company. He became chief engineer in 1914 and consulting engineer in 1925. In 1927 he retired from the Bell of Canada to take the post of consulting engineer for the Brazilian Telephone Company in Rio de Janeiro. For the last few years Mr. Lash had resided on a farm at Alexander, Ark.

Stromberg-Carlson Made 40,000 Switchboards for War

More than 40,000 telephone switchboards—enough to service a city with a population of approximately nine million—have been turned out by the Stromberg-Carlson Company for the armed forces, it was disclosed recently by Lloyd L. Spencer, vice president and general sales manager.

The switchboards were of a wide variety, designed to meet fighting conditions. One switchboard provided a complete indoor or outdoor central office, and another provided equipment for a six-way conference circuit.

Mr. Spencer revealed that the switchboards made up a considerable part of the Rochester, N. Y., communications firm's total war output of more than $125,000,000 worth of precision electronic, radar, and radio equipment.

Morrison, Byrne Named Directors of Rochester Company

F. T. Byrne

Two men of long experience in the telephone field in Rochester, New York, both with the Rochester Telephone Corporation and with the old Rochester Telephone Company, on July 27 were elected directors of the corporation. They are John W. Morrison, chief engineer and vice-president of the utility, and Frank T. Byrne, its commercial superintendent and vice president.

Promotion of the two men by the board of directors was announced by John P. Boylan, president, following a meeting of the board.

Morrison is a native of St. Louis, Mo., and a graduate of St. Louis Manual Training School, and his first job was with the Union Electric Light & Power Company of St. Louis. He later was purchasing agent for the Wesco Supply Company of that city.

In the spring of 1906 he came to Rochester as engineer for the Rochester Telephone Company and when plans were formulated to consolidate that company with the New York Telephone Company he was chairman of the consolidated committee and as such supervised the physical joining of the two companies. With the merger, which took place in August, 1921 he was named chief engineer of the new corporation. He was elected a vice president in March, 1935.

Byrne is a native of Rochester and a graduate of the old Free Academy. He entered the employ of the New York (Bell) Telephone Company in 1900 as a telephone installer.

In 1903 he left the New York Telephone Company for a position in the switchboard department of the Rochester Telephone Company. When the two were consolidated, he was appointed commercial superintendent of the new corporation, which position he still holds. He was elected a vice president March 1, 1935.

Copperweld's 30th Anniversary

August 16, 1945, marks the 30th Anniversary of the Copperweld Steel Company, Glassport, Pa., manufacturer of copper-covered steel wire, strand and ground rods by its original and exclusive molten-welding process.

Since its inception, Copperweld has adhered to the basic principle of its "Molten-Welding" process—the casting of molten copper around white hot alloy steel billets to form a permanent weld of the two metals. Extensive improvements in rolling, wire drawing and overall quality control have followed the original development of this method of manufacture.

Copperweld has been honored with four Army-Navy "E" Awards for its excellent performance in the production of wire for war purposes. According to Mr. W. J. McIlvane, Executive Vice President, Copperweld is now spending more than a million dollars on a plant expansion and improvement program to enable the company to better serve the power, communication and railroad industries in the period ahead.

W. J. McIlvane

Conversion Slated for Wisconsin Exchange

Madison, Wisc.—Stone Lake, Sawyer county, will have a dial telephone system soon.

The state public service commission has approved the request of the Commonwealth Telephone company to install automatic operating equipment at its Stone Lake exchange.

WPB has approved the procurement of equipment, at a cost of about $7,120, the commission was informed.

The local telephone system serves about 90 subscribers and it is now almost impossible to hire operators, the company maintained.

Tokyo Radio Advises Keep Telephones Secure

The August 1 broadcast from Tokyo beamed for Japanese consumption, was of extreme interest to the American communications industry. The announcer showing obvious fear of a complete communications breakdown urged listeners that "when there is fear of losing your telephones in flames in an air raid, it is requested that the subscriber take the telephone out himself." One of the most important phases of the bombing attacks by Army and Navy planes has been the destruction of Nipponese radar stations—for example, an Army Mustang bomber armada July 30 knocked off ten radio and radar stations in and around Tokyo.

Manager of Telephone Company Injured

Oscar Westby, manager of the United Telephone Company, West Concord, Minn., has been under observation at St. Mary's hospital, Rochester, following an accident in which a telephone pole fell on him.

Mr. Westby, who was injured while supervising line work, escaped without broken bones.

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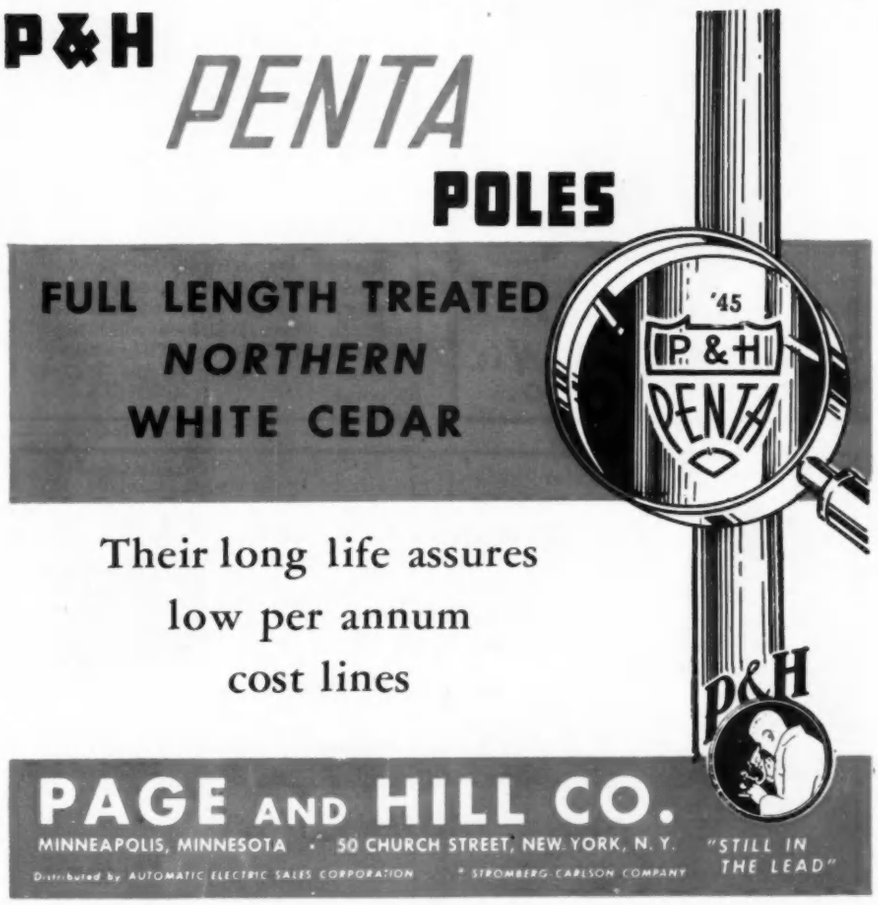

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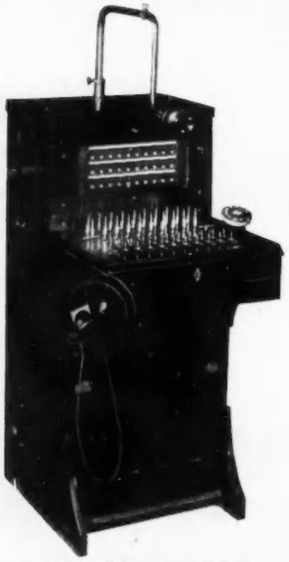

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WANTED—PLANT SUPERINTENDENT for large Class A Mid-Western Telephone Company. The man we want must be a hustler, thoroughly versed in all phases of telephone plant and its construction; he should be able to engineer and develop his own plans and carry them through to completion—in other words, **get the job done.** If you're not afraid to tackle a job full of responsibility, then write us giving full details as to your experience, education, age, availability, etc. Ours is a warm, friendly organization that is going places and we have an attractive proposition for the man that measures up to our requirements. Reply in care of Box 8394, TELEPHONE ENGINEER.

WANTED: Plant Superintendent for large telephone property. Good salary for man having qualifications. In replying, furnish complete information as to age, education, experience, present employment, draft status, small photograph, recommendations, etc. Write Telephone Services, Inc., 16th Floor, Lincoln Tower, Fort Wayne 2, Ind.

WANTED — Combination Plant Man able to maintain both inside and outside plant of either Common Battery or Magneto exchange. Opportunity for permanent employment and good wages. Give age, experience, draft status and availability. Write Oklahoma Telephone Company, Broken Arrow, Oklahoma.

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WANTED: Assistant to General Manager for large telephone property. Must have executive ability and administrative experience. In application furnish information as to age, education, experience, present employment, draft status, small photograph, recommendations, etc. Write Box 8386, c/o TELEPHONE ENGINEER.

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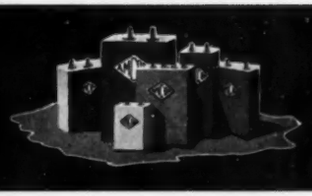

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NEW BOOK on Electrical Circuits. Electrical control circuits, whether used in automatic telephone switching, industrial controls or electronic circuits, are commonly thought of as being made up of physical components such as relays, stepping switches, keys, condensers and the like. These are the familiar and accepted "tools" of the electrical control designer.

In "Circuit Kinks," Harry E. Hershey recognizes the importance of still another tool—a knowledge of the basic circuit elements without which the physical components could not perform their tricks.

"Circuit Kinks" with an easy approach to control and switching problems may be ordered from TELEPHONE ENGINEER Book Corporation, 7720 Sheridan Road, Chicago 26, Illinois, at $1.00 postpaid.

POSITION WANTED: Permanent position as wire chief or plant superintendent with Class A Company preferably located in northeastern U. S., 15 years experience in the telephone industry. 40 years old, married. Can furnish excellent references. Write Box 8396, c/o TELEPHONE ENGINEER.

FOR SALE—Telephone exchange of 152 stations in small Wisconsin town. All company lines metallic, own toll line to toll center. Kellogg 50 line board. All lines and equipment in good condition. Excellent chances for expansion. For full particulars write Box 8397 c/o TELEPHONE ENGINEER.

FOR SALE: Telephone plant of 125 stations, in excellent condition, located in central Texas on good highway and railroad. This plant is in a nice two story residence with all modern conveniences. Good rates, gross income $450.00 per month. Reasonably priced. J. V. Thompson, Carbon Telephone Co., Carbon, Texas.

FOR SALE: Telephone Exchange, 425 stations. Excellent condition, magneto, plant A-1. Post war prospects good. Not affected by war conditions. Good town of 1,200 in south central Kansas. Write Box 8395, c/o TELEPHONE ENGINEER.

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Acorn Insulated Wire Co. 69
American Coach & Body Co. —
American Condenser Co. —
American Creosote Works —
American Creosoting Co. —
American Crossarms Co. —
American Electrical Heater Co. —
American Steel & Wire Co. —
American Tel. & Tel. Co. 18, 19
Anaconda Wire & Cable Co. —
Armstrong Cork Co., Whitall Tatum Glass Insulators Dept. 4, 51
Associated Tel. Engineers, Inc. —
Automatic Electric Co. 40, 41
Automatic Electric Sales Corp. 15

Bartlett Mfg. Co. —
Berry & Co., L. M. 76
Bethlehem Steel Corp. —
Brach Mfg. Co., L. S. 75
Buckeye Telephone & Supply Co. 67, 76
Buckingham Mfg. Co., W. H. 67

Cable Spinning Equipment Co. —
Calculagraph Co. 10
Carney & Co., B. J. —
Carpenter Mfg. Co. —
Chance Co., A. B. 69
Chisholm-Ryder Co., Inc. —
Churchill Cabinet Co. 47
Coffing Hoist Co. —
Colfax Lumber Creosoting Co 53
Collyer Insulated Wire Co. —
Commercial Cord & Supply Co. —
Communication Equipment & Engineering Co. —
Connecticut Tel. & Elec. Div. —
Cook Electric Co. 5, 39, 53
Cope, T. J., Inc. 5
Copperweld Steel Co. 79
Cullom & Ghertner —

Davison Chemical Corp. —
Dicke Tool Co. —
Dillon & Co., Inc., W. C. 61
Drake Electric Works, Inc. 14
D-X Products Co. 71

Eicor, Inc. 63
Electric Products Co., The —
Electric Storage Battery Co. 9
Ericsson Telephone Sales Corp. —
Estwing Mfg. —

Fansteel Metallurgical Co. —
Forged Steel Products Co. —
Four Wheel Drive Auto Co., Inc. —

G & W Electric Specialty Co. —
Gary Service & Investment Co. —
General Cable Corp. 12, 13
General Electric Co. —
General Insulated Wire Works, Inc. —
Graybar Electric Co. 59
Gray Manufacturing Co. —
Great American Industries —

Hallicrafters Co. —
Hammond Drierite Co., W. A. —
Harter Corp —
Highway Trailer Co. 8
Hirsch Organization, Gustav 14
Holtzer-Cabot Electric Co. —
Hubbard & Co. —

Independent Telephone Inst. —
Indiana Steel & Wire Co. 4, 71
International Harvester Co. —
International Tel. & Tel. Corp. —

Joslyn Mfg. & Supply Co. —

Ka-Mo Tools, Inc. —
Kaufman, H. J. —
Kearney Corp., Jos. R. 74
Kellogg Switchboard & Supply Co. 4, 5
Kester Solder Co. —
Klein & Sons, Mathias —
Koppers Company —

Leeds & Northrup —
Leich Sales Corp. 2, 3
Lenz Electric Mfg. Co. 16
Line Material Co. —
Littelfuse, Inc. —
Loomis Advertising Co. —
Lorain Products Corp. 63

MacGillis & Gibbs Co. 77
Matthews Corp., W. N. —
Meredith Co., Inc., Wm. C. —
Michigan Pole and Tie Co. —
Miller, T. R., Mill Co. —
Mitchell, Jay G. 76
Moss Tie Co., T. J. 49
Murdock, Wm. J. —

National Carbon Co. 50
National Telephone Supply Co. 49, 67
Naugle Pole & Tie Corp. —
Newman Mfg. Co., Inc. 4
North Electric Mfg. Co. 80

Oliver Iron & Steel Corp. —
Overton, S. E. —
Owens-Illinois Glass Co. 78

Page & Hill Co. 75
Paragon Electric Co. 51
Phelps Dodge —
Philco Corp. 4, 17
Phillips Electrical Works, Ltd. —
Plastic Wire & Cable Corp. 46
Porcelain Products Inc. —
Porter, Inc., H. K. —
Premax Products —

Rav-O-Vac Co. —
Raytheon Mfg. Co. 11
Rebuilt Electric Equipment Co. 77
Reliable Electric Co. 4, 21, 50
Roebling's Sons Co., John A. 6
Runzel Cord & Wire Co. —

Schauer Machine Co., The 47, 61
Seymour Smith & Sons, Inc. —
Sound Equipment Corp. —
Star Expansion Bolt Co. —
Stewart Brothers —
Stromberg-Carlson Co. 22, 23, 47, 49, 50, 51, 53
Suttle Equipment Co. 72
Sylvania Electric Products, Inc. —
Synthron Company —

Taylor-Colquitt Co. —
Telephone Adv. Inst. —
Telephone Engineer Book Corp. 16
Telephone Repair & Supply Co. 77
Telephone Sales & Service Co. —
Templeton Kenly & Co., Ltd. —
Texas Creosoting Co. —
Thornton-Tandem Co. —
Tinnerman Products, Inc. 43
Toeppen, Manfred K. 76

U. C. Lite Mfg. Co. —
Union Carbide & Carbon Co. —
Unique Mfg. Co. 77
U. S. Motors Corp. —
U. S. Rubber Co. 55
U. S. Steel Corp. —

Valentine Clark Corp. —
Vulcan Electric Co. —

Webster Electric Co. —
Western Electric Co. 45
Weston Electrical Instrument Co. —
Whitney Blake Co. 73
Williams, Geo. E. 76
Woods Merrill J. —
Wood Preserving Div. Koppers Co. —
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